The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Fuel Research Progress

THE report of the Fuel Research Board for the year ended March 31 last is a severely practical and unromantic document. In a less responsible volume there might have been attractive speculation on many points, suggestions as to the possibilities of the future, and hopes held out of probable achievements. But Dr. Lander and his staff have no place for this airy sort of literature—the speeches of some of the commercially-minded authorities more than supply any deficiency in this direction. The Board is concerned with the production of fundamental data, and the recording of ascertained facts. The report shows how much there is yet to be ascertained respecting the chemistry of coal, about such questions as its constitution, grading, and so on, and the long process of investigation on which the research staff has entered. The record for the year adds appreciably to our knowledge on all these points, and slowly but surely advance is being made.

As usual, considerable attention is given to the low-temperature carbonisation problem. It is some years since the Research Board committed itself to the recognition of the process as at least a possibility. Even now the report refers to it in very guarded terms; the processes, it states, adopted for the various commercial plants "will now stand or fall according to the financial results obtained in actual working." Many will hear with surprise that the processes adopted by companies with total nominal capital of five-and-a-half millions number 26. It is safe to say that "it is unlikely that all will prove successful," and equally that "some have unfortunately been launched without that careful trial of full size unit plant which is so essential."

The general conclusion of the Board is still a very open one. "It is still too early to say whether low-temperature carbonisation of coal will eventually prove an economic success on a really large scale, or to say which of the various processes are most likely to prove successful. Some of the processes are, at the present time, doubtless working at a profit, but it does not necessarily follow that they could do so if the scale of working were greatly increased, or if the same process were applied to other coals, or under different conditions." Low-temperature carbonisation, though perhaps the subject that appeals most to the public on account of its commercial aspects, is very far from being the principal field for the Research Board. Its work, as we have said, lies in the patient investigation of fundamental problems, and this is being prosecuted in the sincere and unspectacular spirit that it calls for. The one impression that remains, after a study of the report, is that fuel research ought to have been started half a century earlier. At the end of perhaps another quarter of a century, we shall really know something about the subject.

A Government Department of Science

THE case for the creation of a Government Department of Science will be put before the Royal Commission on the Structure and Organisation of the Civil Service, which will begin its sittings on November 11. The question will be raised in the evidence to be given by the Institution of Professional Civil Servants and the Association of Scientific Workers. The Institution wished to include a memorandum on the question in preparing their evidence for the Treasury Committee of Inquiry into the organisation and staffing of research and experimental establishments, but it has been ruled that this matter is outside the scope of that inquiry. The view of the Institution is that the only finally satisfactory remedy for the defects arising from the growth of the State scientific services lies in the co-ordination of all branches of scientific research into a unified State scientific service. Outside the Department of Scientific and Industrial Research, which has done and is doing so much to organise research associa

tions in connection with our industries, there are a great many research staffs attached to the great Government offices, such as the Admiralty, the War Office, the Air Ministry, the Home Office, and others, and one can understand the desire of the scientific workers engaged for some closer association with one another. It will come as a surprise to many to hear that the fully qualified civil servants engaged in research and experimental work actually outnumber those of the purely administrative class. Their organisation into a general Department of Science, apart from avoiding a certain amount of otherwise inevitable duplication, would be a public recognition of science that would gratify many of those engaged in its service, and might add to the recognition of the scientific point of view in national affairs.

Patent Office Salaries

It has been known for some time that industrial firms have been tempting away members of the Patent Office staff by the usual inducement of better material conditions, and it is therefore not surprising to hear that the Board of Trade has made an offer of an increase of £50 per annum (basic) in the maximum of the scale of senior examiners (at present in receipt of a scale of £600–£25–£750) and 50 £50 allowances to examiners whose present salary scale is £250–£20–£600. The examiners are organized in 25 groups, among which the allowances are to be equally distributed. The staff association has decided to accept the offer as a temporary settlement. The Patent Office, which has recently been compelled to add to its staff owing to the increased volume of work passing through the department, has experienced considerable difficulty in obtaining a sufficient number of qualified candidates for the vacancies in the recruiting grade of assistant examiners. It is understood that the latest offer was made on the basis that the officers affected would assume enlarged responsibilities in order to enable the department to transact a greater amount of business.

The New Chemistry

In the last few years, revolutionary changes in the views held by physicists with regard to the nature of matter have become almost a commonplace. While watching these changes with an interested eye, most of us have probably felt that the time for their application to mundane chemical matters was not yet. This view has received a rather unpleasant jar at the hands of the president of the American Chemical Society, Dr. Irving Langmuir, in his presidential address on "Modern Concepts in Physics and their Relation to Chemistry."

It is peculiarly fitting that the matter should be raised by Dr. Langmuir, for in the course of his brilliant career he has shown an almost unique aptitude for the solution of problems arising in numerous branches of pure and applied chemistry and physics. The point he makes is that the development of such things as the theory of relativity and Schrödinger's theory of wave mechanics, quite apart from their enormous intrinsic value in leading to the acquisition of new knowledge, are of very great importance as changes in modes of thought. The point at issue is really a psychological one. "In trying to estimate the reliability of any of our scientific knowledge," Dr. Langmuir says, "we should keep in mind that the whole complexion of a science may be made to change by the psychology of the investigators which governs the choice of the subjects that are investigated." In the space here available, it is impossible even to outline the trend of thought followed by Dr. Langmuir in his address, but it seems quite clear that the changes which are taking place must be as momentous in their application to chemistry as was the general adoption of the atomic theory. It is quite possible that the delivery of this address may be the beginning of very important changes in the direction of chemical research, and on this account it deserves to be read and pondered by all chemists.

Books Received

Tin. By C. L. Mantell. New York: The Chemical Catalog Co. Inc. Pp. 366. $7.00.

Report of the Anglo-Russian Committee on the British Trade Delegation to Russia. March-April, 1929. London: Anglo-Russian Committee. Pp. 62. 2s. 6d.

Gas Fires and their Settings. By Sir Lawrence Weaver. London: The Fanfare Press. Pp. 64. 7s. 6d.

Report of the Fuel Research Board for the Year Ended March 31, 1929. Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 127. 2s.

The Calendar

Oct. 29	University of Birmingham Chemical Society: "Some Aspects of the Passivity and Corrosion of Metals." U. R. Evans.	University, Birmingham.
30	Society of Dyers and Colourists (Midlands Section): "The Manufacture of Viscose Rayon." D. L. Pellatt. 7.30 p.m.	Derby Technical College.
31	Coke Oven Managers' Association: Annual Meeting and Dinner	Hotel Great Central London
31	Chemical Industry Club: Annual General meeting. 8 p.m.	2, Whitehall Court, London.
Nov. 2	Oil and Colour Chemists' Association (Manchester Section): Annual Dinner and Dance.	Manchester Café, Manchester.
4	Society of Dyers and Colourists (Huddersfield Section): "Dyeing of Indigo and Blue Serges." M. Carter.	Huddersfield.
5	Leicester Literary and Philosophical Society: "Colloids." Miss C. H. Spencer. 8 p.m.	Museum, Princess Road, Leicester.
6	Society of Public Analysts. 8 p.m.	Burlington House, London.
6	Institution of Chemical Engineers: Annual Reception. 8.30 p.m.	New Princes' Galleries, Piccadilly, London.
7	Society of Chemical Industry (Bristol Section): Lecture and Demonstration on "Special Heat and Corrosion-Resisting Steels." 7.30 p.m.	University, Bristol.
7	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
8	Society of Chemical Industry (South Wales Section): "Smokeless Fuels and How They Burn." H. J. Hodsman.	Thomas's Café, High Street, Swansea.
8	National Smoke Abatement Society: "Coal and its Combustion." A. McCulloch.	College of Technology, Manchester.
8	Institute of Metals (Sheffield Section): "Nickel-Silver." F. Orme. 7.30 p.m.	University, Sheffield.
8	Oil and Colour Chemists' Association (Manchester Section): "Some Reminiscences of a Government Laboratory." Dr. Fox. 7 p.m.	Milton Hall, Deansgate, Manchester.

The Work of the Fuel Research Board

Report of Director

Below are given notes on the work of the Fuel Research Board for the year ended March 31, 1929. The notes are based on the report of the Board, just issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, pp. 127, 2s.)

It is gratifying to note the increasing attention being given to fuel research, both by individual firms and by industrial organisations. During the year the Gas Light and Coke Co. opened new research laboratories at their Fulham Gasworks, and the equipment includes experimental settings of full-size horizontal and vertical retorts with special condensers, washers, purifiers, etc., as well as the usual laboratory apparatus. Imperial Chemical Industries, Ltd., and other firms are also spending large sums on those aspects of fuel research of more special interest to their activities.

The National Federation of Iron and Steel Manufacturers has formed an Industrial Research Council, which will receive financial assistance from the Department of Scientific and Industrial Research, in the same way as Research Associations. This new organisation will develop the work already being carried out by Coke Research Committees on metallurgical coke, and other work of equal importance to the industry.

Fuel and Power

The National Fuel and Power Committee, which was appointed in 1926 by the President of the Board of Trade "to consider and advise upon questions connected with the economic use of fuels, and their conversion into various forms of energy," has issued two reports during the year. In the first of these, they emphasise the importance of research, and particularly the necessity for the application of the results of research and the consequent necessity for employment, on the executive side of industry, of more men trained as fuel technologists. The second report of the Committee dealt with a specific reference on proposals to extend and amend the existing legislation relating to gas.

COMBUSTION CHAMBER OF HORIZONTAL RETORT USED FOR RESEARCH ON HIGH TEMPERATURE CARBONISATION AT THE FUEL RESEARCH STATION. THE PHOTOGRAPH SHOWS THE STATE OF THE RETORT WHEN COOLED DOWN AFTER WORKING FOR 893 DAYS AT 1,350° C.

The Physical and Chemical Survey

The Physical and Chemical Survey of the National Coal Resources has progressed steadily. A committee was appointed in June, 1928, to deal with the South Wales Area. With the appointment of this committee the organisation covers coalfields producing 85 per cent. of the coal raised in Great Britain.

If coal is to be used to the best advantage, it is necessary to know what properties are desirable in the coal to be used for any particular process, and how variations in the coal affect the working of the process, and it is very desirable to be able to test these properties on laboratory samples. One of the objects of much of the work is the development of methods of determining the various properties, and the correlation of the laboratory results with full scale working. The same considerations apply to the use of coke, and the examination of methods of testing coke in the laboratory.

Carbonisation

Large scale investigations on the carbonisation of coal in gas retorts have continued at the Fuel Research Station. A lengthy investigation into the effect of the size of the coal charged to the retorts on the nature of the products, has been concluded, both vertical and horizontal retorts having been used for this purpose.

It is now nearly ten years since the vertical gas retorts were erected, and this setting is approaching the end of its useful life for experimental purposes. The retorts were originally erected for the purpose of assisting the gas industry to utilise the greater freedom as to methods of manufacture of gas which resulted from the adoption of the thermal system of charging and the abolition of a compulsory illuminating standard of quality, and in particular to provide reliable data as to the effect of steaming the charge during the carbonising period. This work has been completed, and a number of other investigations have also been carried out, the results of which have been widely adopted by the industry. There is still much to be done on the horizontal retort setting before the programme of work for which it was erected can be completed.

The provision of a second water gas plant at the station has made it possible to carry on more extensive work on the details of this process, and the investigation will be given a higher priority in the programme of the station than has been possible in the past.

Low Temperature Carbonisation

The development of low temperature carbonisation of coal has now reached a definite stage. A number of commercial plants on several different systems have been or are being erected, and the processes will now stand or fall according to the financial results obtained in actual working. Among the plants now working is that erected by the Gas Light and Coke Co. at the Richmond (Surrey) Gasworks, to the general design developed at the Fuel Research Station. Companies with a total nominal capital of some £5,500,000 have been

LOW-TEMPERATURE CARBONISATION RETORTS ERECTED BY THE GAS LIGHT AND COKE CO. AT RICHMOND, SURREY, TO THE DESIGN DEVELOPED AT THE FUEL RESEARCH STATION. THE PHOTOGRAPH SHOWS THE HEATING WALLS IN COURSE OF ERECTION.

formed to develop some 26 different processes; some of these are now working, and others should be producing in the near future. It is unlikely that all will prove successful, and some have unfortunately been launched without that careful trial of full size unit plant which is so essential.

The investigations carried out at the Fuel Research Station since its erection have shown the type of products that can be expected from the low-temperature carbonisation of a variety of different coals, and have furnished data of value for the development of any type of low-temperature carbonisation process. The tests which the Director of Fuel Research has been authorised to carry out on plants developed and erected elsewhere, have shown the actual technical results obtained from them, and thus materially assisted in their development; or have indicated the conditions under which each type of plant is likely to have the best chance of successful working.

Still an Open Question

It is still too early to say whether low temperature carbonisation of coal will eventually prove an economic success on a really large scale, or to say which of the various processes are most likely to prove successful. Some of the processes are, at the present time, doubtless working at a profit, but it does not necessarily follow that they could do so if the scale of working were greatly increased, or if the same process were applied to other coals, or under different conditions.

In any system of carbonisation a certain proportion of the heat value of the coal is necessarily lost during the process. This loss, together with the operating costs, must be compensated for by the higher value of the products. The products are coke, tar, gas and ammoniacal liquor. The calorific value per lb. of the coke is roughly the same as that of the coal from which it was made, consequently when valued on a thermal basis it will fetch only the same price as an equal weight of the raw coal. It follows that, when the raw coal is suitable for the purpose for which the coke is to be used, the loss in weight of solid fuel and the cost of operating the process, including the cost of heating the retorts must be met entirely by the receipts from the gas and tar.

Where the coke is to be used for a purpose for which the original coal is not suited, *e.g.*, when a cheap slack is being converted into a lump coke suitable for domestic purposes, the price obtained for the coke may cover the cost of the coal used and even leave a margin towards the cost of working. The price obtainable for the gas will depend on the quality of the gas and the purpose for which it is to be used. The highest price, if the process produces a gas of suitable quality, is obtainable where the gas can be disposed of as town's gas, *i.e.*, to a gas undertaking. Where this is not possible, the gas can be used for any heating purposes required in the neighbourhood of the plant, and in this case the price obtainable depends solely on the cost of alternative methods of providing the heat required. This may even be lower than the cost of an equivalent amount of the coal used for treatment when compared on a thermal basis.

Each Case on Its Merits

Every individual undertaking must be considered on its merits, with due regard, on the one hand, to the nature of the coal it is proposed to treat, and the available supply, and, on the other, to the outlets for the coke, tar and gas. On these factors will depend the type of plant, and the site for the plant, that is most likely to be capable of working at a profit. The working costs of a plant include labour, power, supervision, maintenance, depreciation and interest on capital. A fairly correct estimate of most of these items can be made by competent men with a knowledge of the local conditions and of the working of any plant that has been operating on a commercial scale for a comparatively short period. The question of maintenance and depreciation, however, is a difficult one, and the life of the retorts will have an important bearing on the ultimate balance sheet. The life can only be ascertained with certainty by working the retorts until they require renewal, and unless the life is short and replacement expenses heavy, this must take a considerable time.

Two new low temperature retorts are being installed at the Fuel Research Station to a slightly modified design, which it is thought may be an improvement on the patterns previously in use there, particularly as regards their life.

Hydrogenation

Experiments on the hydrogenation of coal are being carried out at the Station in both the intermediate scale continuous plant which is capable of treating 1 ton of coal per day, and in the small bombs, in which about 250 grams of coal are treated at a time. Dr. Ormandy, with assistance from the D.S.I.R., is continuing his investigation of some of the products of hydrogenation, and the methods of determining them.

The work upon the conversion of non-caking coals into solid products having strong caking power has also been continued, and further experience has shown that carbonaceous materials ranging from cellulose and wood to anthracite, and including all types of coal and lignite, can, by controlled treatment with hydrogen under pressure, be converted into material which on carbonisation, yields a strong coherent coke. This observation is of fundamental interest in relation to the constitution of coal and is being explored in detail. The results up to the present are of considerable interest, but it is not desirable to give details until the investigation has reached a more advanced stage.

Production of Hydrogen

In connection with the work carried out on the hydrogenation of coal, etc., by the Bergius process, a Lane-Rogers hydrogen plant was installed in 1927. This process, as is well known, works upon the reaction between reduced iron ore and steam. During the past year tests have been carried out, both in the laboratory and on the plant, to determine the conditions for obtaining maximum efficiency in hydrogen production. Special points studied have been (*a*) the nature and size of the contact material in the retorts, (*b*) the most suitable cycles for oxidation and reduction in the plant, (*c*) the kinetics of the actual reactions involved in the process, and (*d*) the prevention of carbon deposition during reduction causing subsequent impurities in the hydrogen generated.

Work carried out in the laboratory on the efficiencies of various contact materials included tests on iron ore, powdered iron ore dispersed over asbestos, and iron oxide deposited on pumice stone, magnesia firebrick and silica firebrick. It was found that iron oxide deposited on pumice stone was the most reactive material tried, the availability of the iron present being greater than in the case of the iron ore. From the detailed investigation carried out it was shown conclusively that the reactions involved in the process were :—

$$Fe_2O_3 \xrightarrow{\text{not reversible}} Fe_3O_4 \underset{\text{reversible}}{\rightleftharpoons} Fe$$

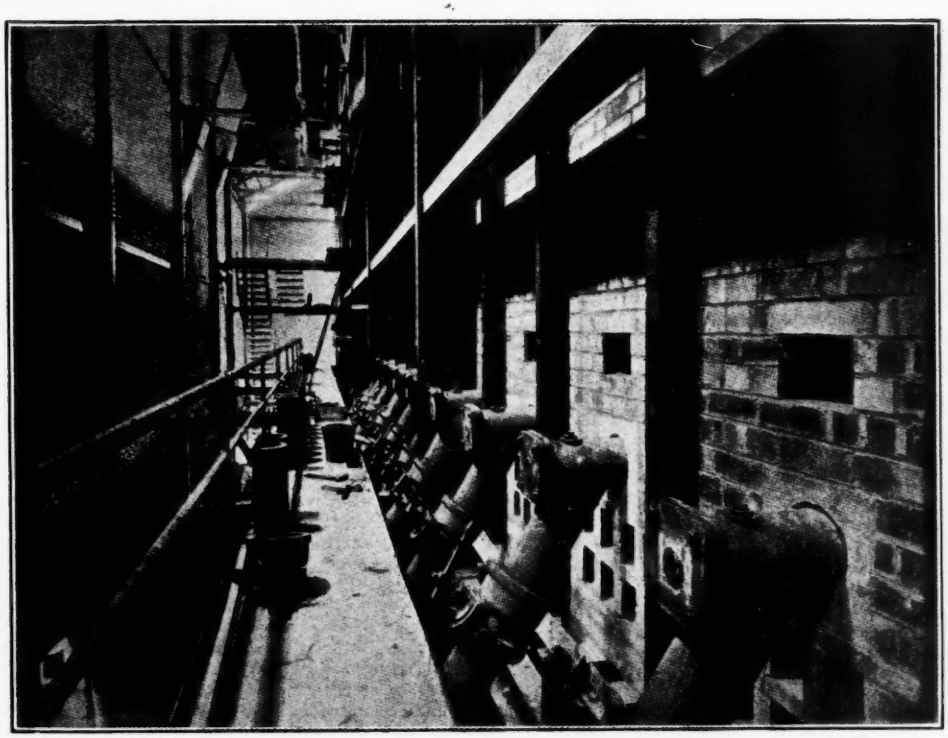
X-Ray Examination of Coal

The use of X-rays for the examination of materials is being increasingly adopted in a number of branches of industry ; their application to the examination of coal has been made the subject of research by many investigators, notably in this country by Mr. C. N. Kemp, who since 1924 has been working in conjunction with the Fuel Research Division. The investigation is concerned with the examination of the ash in coal and depends upon differences in the relative absorption of X-rays by different substances. As the absorption by an element varies with the fourth power of its atomic number, it follows that not only will the inorganic constituents in coal be revealed in marked contrast to the organic coal substance, but that it will be possible, under suitable conditions, to differentiate between the kinds of impurity present.

From the results so far obtained it is evident that X-ray examination should provide a rapid means of determining the nature and distribution of the ash, and also of estimating approximately its amount. Moreover, the structural characteristics of the ash may be studied by means of stereo-radiographs. The practical bearing of these results is being kept in view. The application of the method to coal-washing, for example, should prove of value.

The Constitution of Coal

Investigations on the constitution of coal are being carried out in various institutions with assistance from the D.S.I.R. Professor W. A. Bone is continuing his work on the "maturing" of coals, the methods including the extraction of the coal with benzene under pressure, the oxidation of the coal with alkaline permanganate, and the bromination of coals, together with the examination of the resulting products. The coals examined include brown coals and lignites from Australia, Canada and Germany, a bituminous coal from South Africa,



THE FUEL GAS SUPPLY TO THE LOW TEMPERATURE CARBONISATION RETORTS ERECTED AT RICHMOND BY THE GAS LIGHT AND COKE CO.

as well as coals from this country. Considerable quantities of almost every possible benzene carboxylic acid, with the exception of benzoic acid, have been isolated from the crude acids resulting from the oxidation of the coal substance with alkaline permanganate. The total yields of such crude acids amount in each case to between 40 and 50 per cent. of the weight of the original coal substance, from which it may be inferred that a large part of the coal substance is " benzenoid " in character.

Many Visitors to the Station

The interest taken in the work of the Fuel Research Station, as indicated by the number of visitors, shows no diminution. The total number of visitors amounted to 523 during the twelve months covered by this report. This number includes those who came in organised parties which were arranged for the following :—Members of the House of Commons, Mines Department (two visits), Royal Sanitary Institute Smoke Inspectors' Course (two visits), Institution of Civil Engineers (in connection with the Centenary Celebration), Delegates to the World Power Conference (two visits), Institution of Mining Engineers, Military College of Science Officers' Class, and Students' Societies from University College, London, Imperial College of Science and Technology, Northampton Institute, East London College, and King's College, London.

British Tar for Roads

To the Editor of THE CHEMICAL AGE.

SIR,—My recent appeal to county councils and other public bodies to use British tar in the making and maintenance of our roads has provoked considerable controversy. The advocates of foreign bitumen, which is the alternative to tar, are very active in defence of their product. It is stated, on behalf of bitumen importers, for example, that " the bitumen industry means employment, whereas tar is a by-product of the gas and coke industries and its use does not involve the direct employment of any more labour." I would now ask those who take the same view how many British workmen are actually employed at the four bitumen refineries in this country. I suspect that they number at most a few thousand, but it will be interesting to have the figure for comparison with the 100,000 workers in the gas industry and the large number employed in the coke industry.

As for the second point, that a by-product does not in itself provide employment, I can only say that if, owing to the use of foreign bitumen on our roads, the market for British tar is lost it will be a very serious matter for the gas, coke and steel industries, and also for the miners of this country, who find in the tar producers the biggest commercial consumers of coal. If the price of tar be taken as 5d. a gallon, the gas companies alone receive £4,000,000 a year from this source. The loss of any considerable part of this vast sum would upset the whole industry, raise the price of gas, reduce its consumption, cut down the demand for coal, and lead to very serious unemployment. The same holds true if the coke industry loses its tar market because of the use of bitumen on our roads.

Let there be no doubt about the point that the use of British tar on British roads is vital to some of our biggest home industries—gas, coke, steel and coal. It seems folly, therefore, to add to their present troubles by going out of our way to use foreign bitumen as a substitute.—Yours, etc.,

28, Tavistock Square, W.C.1. W. THORNE.

River Pollution Actions Settled

MR. JUSTICE CLAUSON, in the Chancery Division on Thursday October 17, was informed of the settlement of two actions which arose out of an alleged pollution of the River Gipping at Stowmarket by the British Acetate Silk Corporation, Ltd. One of the cases was listed as Freshwater against the Corporation and the other as Quinton against the Corporation. The defendants in each case submitted to judgment for a perpetual injunction, an inquiry as to damages and the payment of plaintiffs' costs. The Judge made orders in these terms. On Wednesday last, the action of Bradbury versus the same defendants was mentioned. Mr. Beaumont said that the parties had come to terms, and had agreed upon an order (on the same lines as in the other two cases) in which there would be an injunction in the terms of the writ and an nquiry as to damages. The Judge granted the order.

Dewatering Clay by Electrophoresis

Recent American Research

VARIOUS methods for removing water from clay suspensions or " slips " have been tried at the Northwest Experiment Station of the United States Bureau of Mines, Seattle, Washington, in co-operation with the University of Washington. The potter's filter press is the most commonly used in the United States. Heated pan dryers are used for British China Clay ; rotating, steam-heated cylinders on to the surfaces of which the suspension is spattered are used for drying Georgia ochres ; continuous, rotary suction filters can be used for the more non-plastic suspensions and slimes ; rotary suction filters in combination with steam-heated cylinders are coming into use for pottery clay bodies, and one spray evaporator is now used for Florida kaolin. Some study has been made of the filter press and the spray evaporator at this laboratory, and work is now under way on the electrical method.

Patents were originally issued in 1903 by the United States to Count Botho Schwerin of Germany for dewatering peat by electricity, but at the present time it is understood that only one commercial plant is in operation on clays in Germany. The process has also been suggested for dewatering cement slimes before calcination.

The Schwerin Process

The operation consists of passing a direct current through the suspension and providing a mechanical means of removing the damp mass from the electrode upon which the particles collect. Clay particles suspended in water carry a negative charge and will pass to the anode, which is a cylinder of type metal rotating slowly through the slip. The cylinder collects a plastic coating of clay while immersed, and is scraped clean during the exposed part of its revolution. When the clay suspension is renewed as fast as used, such a machine provides a continuous and mechanical method of dewatering. This has been the handicap of the common hand filter press. With the best acting clays, the water content has been reduced until the clay is in the plastic working condition suitable for moulding pottery or other ceramic ware. Further removal of water to bring the clay to the dry condition must be accomplished by evaporation.

A few tentative indications have been noted by the Bureau of Mines investigators as a result of tests of several clays in a small machine. These are as follows : Different clays exhibit individual characteristics under the influence of an unidirectional electric current. This action is probably related to the same properties which influence the plasticity and working ability of the material, and may be a useful method for classifying clays. Thorough dispersion seems to be an essential requirement for good results. The addition of an alkali increases the dispersion and activity of the clay particles, and causes a faster movement toward the anode. The addition of an acid coagulates the particles into clusters and retards the movement, but with the clays investigated did not cause them to reverse their direction of travel. Florida kaolin, a plastic type of China Clay, was dewatered satisfactorily, while one brand of English kaolin, representing one of the weakest China Clays, gave very poor results. The most efficient operation with the small machine used was obtained when the clay suspension was not depleted below 15 per cent. solids.

D.S.I.R. Investigation of Steel Structures

A PRELIMINARY programme of work has been decided upon by the committee of the Department of Scientific and Industrial Research which has been appointed to examine present methods and regulations for the design of steel structures and bridges. The chairman of the committee is Sir Clement Hindley. Discussing the investigations, Mr. C. S. Kavanagh, director of the British Steel Work Association, and late Commercial Attaché at Berlin, said that they afforded a unique opportunity for whole-hearted co-operation between the steel maker, steelwork fabricator, designer, and scientific worker. " An accepted standard for structural work would stimulate the iron and steel trade," he added, " and if, as may be confidently hoped, an authoritative standard secured acceptance in the Empire, there would be opened up a wide field for closer Imperial co-operation."

Safety Measures in the Chemical Industry

Some Notes on the Home Office Industrial Museum

About two years ago, there was opened in Horseferry Road, Westminster, the Home Office Industrial Museum. The Museum aims at showing means by which industry in its various branches may be carried on in a manner consistent with the health, safety and welfare of the workers. The notes below deal with the aspects of the Museum having special importance from the point of view of the chemical industry.

THE Home Office Industrial Museum is a permanent exhibition of methods, arrangements and appliances for promoting the safety, health and welfare of the industrial workers in the manufacturing industries and other industries which come within the sphere of Home Office administration. The establishment of the Museum was decided upon, and the building erected, before the war, but the war began before it could be taken into use. During the war, and for some time afterwards, it was devoted to military uses. The restoration of the building to its pre-war condition and the organisation and collection of the exhibits was taken in hand in 1925, and the Museum opened in December, 1927.

The exhibition is the first of its kind in this country, though similar exhibitions have existed in important industrial centres on the Continent for some time, *e.g.*, in Milan, Berlin, Munich, Amsterdam, Paris and Lausanne.

Purpose of the Museum

The purpose of the Museum is to show the best methods for the time being which are known to the Home Office for protecting the industrial worker against accidents and promoting conditions most favourable to his or her health and efficiency, and it is hoped that it will contribute in this way not only to the well-being of the workers, but also to the efficiency of British industry. It is an axiom accepted by all progressive employers that the best conditions are necessary to secure the highest standard of efficiency and the maximum output.

The Museum is open to the general public between certain hours, but it is mainly intended for those who are directly concerned with the problems of safety, health and welfare in industry.

Steam Boilers and Steam Fittings

Steam boilers and steam fittings in ordinary industrial use are subjected to steam pressures which vary from a few pounds to about 350 lb. per square inch. Failure of any part of the plant to withstand the pressure may result in a serious explosion.

The principal causes of explosions are :—Working at an excessive pressure ; defects in design or workmanship ; defective material ; stresses set up by water-hammer action ; wasting of the material through corrosion, grooving and pitting of the plates or tubes ; and user's ignorance or neglect to keep in proper condition.

As safeguards against these dangers, the law requires the provision and maintenance of (*a*) a safety or relief valve, (*b*) a steam gauge to indicate the pressure of the steam, and (*c*) a water gauge to show the height of water in the vessel. It also requires that the boiler and fittings shall be thoroughly and regularly examined by a person fully competent for the purpose. The exhibit includes the front plate (full-size model of a steam boiler (Lancashire type) to which are attached the several fittings required by Statute ; also various other types of steam fittings and appliances. Many of the exhibits are partially sectioned so that the internal parts may be seen.

Spraying Plant for Cellulose Lacquers

Cellulose lacquers have in recent years come into extensive use in many branches of industry, *e.g.*, motor-coach work, furniture, earthenware, boots, etc., etc. The lacquers are made by dissolving cellulose nitrate or cellulose acetate in solvents such as amyl acetate, butyl acetate, acetone, or benzol, and adding gums, pigments, etc.

The lacquer is most frequently applied as a spray, and in view of the nature of the solvents, most of which are highly inflammable and have toxic properties, it is necessary to take precautions for the prevention of explosion and fire and for the protection of the worker. The spraying is done in a cabinet, at the back of which is an exhaust fan. The fan should be of adequate size to produce an inward air speed of at least 75 ft. per minute at any point in the plane of the front of the cabinet. As the risk of the formation of an explosive mixture of vapour and air can never be entirely eliminated, the use of naked lights must be absolutely prohibited near the work, and all electrical equipment must be installed and maintained so as to obviate the possibility of ignition by a spark or arc. Motors, fuses, starters and switches must not be inside or near the cabinet unless they are of a gas-proof type, and all wiring, including that of pendant lamps close to the cabinet, should be protected by steel conduit. As a further precaution, the cabinet should be constructed of fire-resisting material.

Dust, Gas and Vapour Explosions

The possibility of a severe explosion through the ignition of a dust cloud by a naked light or spark is always present in a factory or warehouse where carbonaceous dust is produced, or even some kinds of metallic (*e.g.* aluminium) dust. This danger is not generally recognised, although several explosions are reported every year. During the seven years 1921-27, 39 such explosions came to the notice of the Factory Department, causing 5 deaths and, in some of the cases, much damage to property. Of these, malt dust caused 7, sulphur 6, coal and seed 4 each, grain-flour and dyestuffs 3 each, cork, ebonite and aluminium 2 each, rubber, pitch, sugar, linoleum, spent oxide and oatmeal 1 each.

It is important to bear in mind, first, that it is when the dust is raised as a cloud that risk of explosion occurs, and secondly, that what is in the beginning a small explosion may be greatly increased in violence by the dust clouds which it raises from beams, rafters, etc.

Precautions

The following precautions are recommended :—

(1) Dust should be prevented from escaping into the atmosphere of the work, store or other rooms by enclosing all machines, etc. as far as possible.

(2) The accumulation of dust on floors, machine frames, overhead beams, shelves, etc., should be prevented by systematic cleaning of such places. This may be most effectively done by means of a vacuum cleaner.

(3) Naked lights should not be used in places where dust clouds may arise, and precautions should be taken against mechanical and electrical sparking.

(4) An explosion inside the grinding system may be prevented from spreading to other parts of the plant (*e.g.*, dust collectors) by the provision of explosion vent pipes and suitable rotary valves or conveyor chokes.

Methods of carrying out these recommendations are shown. The exhibits include a baffle for malt mill, showing method of choking an explosion at the rolls ; a " Ringrose " lamp for indicating the presence of inflammable and explosive gases ; faulty " safety " lamp, the perforated gauze of which led to a fatal accident ; sections of a good type of blow lamp for petrol and paraffin ; oxygen reducing valve of faulty design, which burst in use ; a gas-heated drying stove for use in enamelling industry, etc.

Fire Prevention and Escape

One exhibit illustrates various arrangements and appliances for dealing with outbreaks of fire at factories before the arrival of the fire brigade and for assisting the local or works brigade as the case may be.

Alarm systems shown include the " gravity " alarm system, which operates when the heat melts a ring of fusible metal at the top of the room, when an alarm bell rings and at the same time the warning is transmitted to the telephone exchange and thence to the fire station. Another type is the " Pearson " system, which operates when the heat, acting upon two sensitive metal strips, causes them to expand and come into contact. The contact closes an electric bell and indicator circuit.

Extinguishers (shown in section where possible), include (1) Soda acid type, for wood, textile and general risks ; (2) Plain water extinguisher, for places where delicate fabrics, etc. might be damaged ; (3) Foam type, for oil and spirit

fires; (4) Carbon tetrachloride type, for motor car and electric fires; (5) "Total" extinguisher from which finely powdered bicarbonate of soda is expelled; suitable for oil and tar fires The jet offers high resistance to electric current.

Other exhibits include hand pumps, automatic sprinklers, inside hydrant installations, couplings, standard adaptors, hand control branch pipes, life lines, etc.

Eye Accidents

The number of accidents to the eyes which occur in premises under the Factory Acts is very large. During the five years 1924–28 the number in all industries amounted to 33,687, an average of rather more than 6,700 a year. Twelve ended fatally. In the chemical, paint, etc. industry the number of such accidents varied from 270 in 1924 to 322 in 1928.

It would seem that the obvious remedy against these accidents would be the wearing of goggles by the worker. For some processes (*e.g.*, in the chemical industry) the provision and use of goggles are made compulsory, and in a number of other processes they have been introduced by voluntary action on the part of the employers, or adopted by the workers themselves. The exhibit includes goggles which have been actually in use, and which are heavily pitted or fractured by particles which but for them would have struck the eye of the worker.

Many employers, however, have experienced great difficulty in inducing their workers to wear the goggles when provided. There are several reasons for this. The goggles supplied have often been badly designed so that they do not fit the worker and are uncomfortable to wear; or they have no ventilation and are hot to wear and the glasses fog or restrict the workers' vision too much; or the particular operation, *e.g.*, sharpening a tool, may only be done at irregular intervals.

These difficulties are not insuperable, at any rate in many cases. Different designs suit different processes, and care is needed in selecting a suitable design for the work. The exhibit shows various types which can be recommended.

There is another and alternative remedy which, where it can be adopted, has a decided advantage over goggles. This is the provision of an adjustable transparent screen between the worker and his work. These are being adopted in a number of works.

"Safety First" Propaganda

THIS exhibit illustrates methods of propaganda actually adopted and results obtained in works in this country. It is necessarily limited in scope, both because comparatively few firms in this country have so far adopted organised safety schemes, and because the methods do not readily lend themselves to exhibition. The exhibits include (1) a chart showing savings in accident compensation effected by the establishment of safety schemes; (2) "Safety First" posters and slogans issued by the National Safety First Association, National Employers' Mutual Insurance Association and individual firms; (3) warning notices used by particular firms; (4) safety committees' reports; (5) safety competitions between different departments or sections of works; (6) leaflets issued by various firms describing their safety arrangements, accident records, etc.

Gas Poisoning

A number of cases occur every year in which persons engaged in cleaning, repairing or other work inside tanks, chambers and other receptacles are overcome by gas, often with fatal results. This danger has already led in the case of chemical works to regulations being laid down which require certain precautions to be taken; but the same danger arises in many other classes of works—*e.g.*, in steel and iron works (flues and furnace chambers, etc., the air of which may contain a high percentage of carbon monoxide gas), breweries (vats containing carbon dioxide gas from fermentation), cement works (kilns containing carbon monoxide gas from fires), indiarubber works (tanks containing naphtha, carbon bisulphide and other solvents).

In fact, the dangers are liable to arise in any works where gases are generated or used, or volatile liquids such as benzol, naphtha, carbon bisulphide are stored or used. The risk is incurred not only by the person engaged in the work but also by any person who has to enter the tank, chamber or receptacle to rescue him in the event of his becoming gassed. Lives are frequently lost in the course of rescue operations.

In the six years 1921-26, 1,000 cases of gassing were reported to the Factory Department, resulting in 107 deaths. Of these, 648 (causing 61 deaths) were due to carbon monoxide. The danger from gassing by carbon monoxide is present in any industry in which coal gas or producer gas is used for power, heating or other purposes.

Rescue Apparatus

In all places where gas is liable to be present, work should be strictly prohibited unless either the worker is provided with a suitable type of breathing apparatus, or efficient means have been taken to remove any dangerous gas from the tank, chamber or receptacle and the air has been tested and found by a responsible person appointed by the manager to be free from gas; but if suitable breathing apparatus is not worn, no person should be allowed to enter a tank, chamber or receptacle except with a life line, which is held by a person outside. For testing the air, small animals, such as mice, may be used and are kept at the factory for the purpose: alternatively, samples of the air should be taken and analysed.

The exhibit includes various types of breathing apparatus for use under the conditions mentioned and in rescue operations including:—

(1) "Proto" self-contained oxygen breathing apparatus (2-hour type); (2) "Salvus" self-contained oxygen breathing apparatus (½-hour type); (3) smoke helmet with air tube and bellows, for work in smoke fumes; (4) "Antipoys" short-distance breathing apparatus, consisting of face mask and short length of specially designed tubing leading to air supply; (5) "Puretha" canister or army type of respirator (this type is very convenient for use in circumstances in which the use of a helmet and tube or a self-contained type of breathing apparatus would be inconvenient and cumbersome). But its effectiveness is limited. Different containers are required for different kinds of gas, and the apparatus is not suitable for use in confined spaces such as stills, tanks, etc., or in any circumstances where carbon monoxide or a highly concentrated gas is liable to be present); (6) safety belts, designed to comply with Home Office Regulations as to provision of life belts in chemical works, and intended for use by persons working in places where there is a risk of gassing and by persons engaged in rescue; (7) "Novita" oxygen resuscitating apparatus for restoring persons who have been partly asphyxiated or drowned; and (8) "Novox" apparatus for administering "Dicarbox" gas (oxygen and 5 per cent. of carbon dioxide) to persons suffering from carbon monoxide poisoning, oxygen want, etc.

Respirators

Respirators, as distinct from breathing apparatus, are designed to protect the wearer from the inhalation of coarse or moderately coarse dusts. *They are of no service as a protection against gases, poisonous fumes, smoke or very fine dust.*

The efficiency of a respirator depends, in the first place, upon the power of the filtering medium to remove the injurious particles from the air as it passes through the medium. On the other hand, a material having a high filtering power may oppose considerable resistance to breathing. The object, therefore, in designing a respirator is to obtain a medium which will combine a high filtering power with low resistance to breathing. Several layers of a thin material may have better filtering power than a single layer of thick material, and at the same time oppose less resistance to breathing. For example, in tests made in the United States against silica dust in air (filter area, 100 sq. centimetres; rate of air flow, 10 litres per minute), it was found that 16 plies of cheese-cloth removed 45 per cent. of the dust with 0·4 in. resistance; 2 plies of unbleached muslin removed 24 per cent. of the dust with 0·6 in. resistance, and 1 ply of Canton flannel removed 10 per cent. of the dust with 0·6 in. resistance.

When the respirator has been in use for some time the air spaces of the filtering medium tend to become blocked with particles of dust. This condition, though it increases the filtering power, also makes the medium more difficult to breathe through. If the filtering medium is allowed to become more or less choked and offers resistance to the breathing, the air may pass between the edge of the respirator and the face instead of through the medium. To avoid this cause of failure, the edges of the respirator should fit closely to the face, and the filtering medium should be cleansed or renewed at frequent intervals. Respirators constructed of rigid material may be provided with a pneumatic rim, which will permit

of their close application to the face with comfort. Some woven fabrics may lose their filtering power after washing.

To guard against the risk of communicable disease, each worker should have his own respirator and interchange should not be permitted unless every part of the respirator has been thoroughly cleansed with a disinfectant. Various types of respirator are shown in the museum.

Protective Clothing

Special clothing for the whole or parts of the body is required in many industrial processes to protect the worker or the worker's ordinary clothing against wet, dust, extremes of temperature, grease, oil, acids; cuts from handling sharp or rough edges; burns from handling hot material, and the like.

In a number of processes the provision of such clothing has already been made compulsory, and in many other processes where such provision is not compulsory, protective clothing is supplied by some employers who realise the need for protection of this kind.

The exhibit at the museum shows various types of protective clothing actually worn, as follows:—Protection against wet; different types of overalls, suits and head coverings, each with some special feature that makes it suitable for a particular purpose; types of masks and gauntlets for protection of workers in bottling of aerated waters against risk of injury from bursting bottles; protection against extremes of temperature and against the weather; protection against chemicals, oils and grease; protection of feet and legs against splashes of molten metal (iron foundries); different types of hand and arm protectors and aprons, each with some special feature that makes it suitable protection against a particular risk.

Non-Ferrous Metals in Chemical Engineering

(From a Correspondent)

THE development of the chemical industry, both in the directions of increased output and increasing variety of products, has resulted in the development of alloys suited to resisting corrosion or attack by various chemicals. While a good deal of success has attended the efforts of metallurgists in this direction, there are many problems still awaiting solution. No alloys have been developed which resist attack by all corroding media, but it is possible from the wide range of alloys now available to select materials possessing good, and in many cases excellent, resistance to one or more classes of chemical products.

In the chemical industry all sorts of metal equipment are required, including tanks, pans, vats, autoclaves, piping, valves, stirrers, pumps, condensers, evaporators, stills, containers of various kinds, fans, ducts, baskets, wire, nuts, bolts, tie rods and structural members. The choice of suitable material is of great importance, not only on economic grounds with regard to the duration of its working life, bnt also with regard to the effect on the product if the metal is corroded and attacked. The essential qualities, after relative non-corrodibility and resistance to attack, are ease of fabrication and strength. The relative importance of these other qualities depends on the particular application, and where conditions permit of a choice of materials, initial cost obviously becomes another important consideration.

Corrosion-Resistance

In recent years, corrosion and means of overcoming it have been the subjects of careful and fruitful investigation, and in this connection the attack of metals by acids and chemical products has received considerable attention. Some metals, such as gold and platinum, are, in virtue of their low electrode potentials, very resistant to attack by most substances, but on account of their high cost find only very restricted application. While the resistance of metals to passage into solution in electrolytes—which is in the inverse order of their position in the electro-chemical series—is one factor on which their resistance to corrosion depends, resistance to corrosion is also associated with the formation of protective coatings resulting from the corrosive action, as exemplified by aluminium, and other metals and their alloys.

In addition to the recognition of the part played by resistant films of corrosion products, there have been made in recent work attempts to correlate crystal structure, the constitution of alloys, and other factors with resistance to attack. It is generally known that many alloys of the solid solution type are more resistant than either of the two metals of which they are composed, and it has been suggested that in such alloys the chemical affinities of the respective metals are satisfied, and the tendency to attack by corroding media, or chemical combination with corroding media, is thereby reduced. A considerable amount of experimental data has been published from time to time regarding the corrosion of different metals and alloys in various corroding media. This cannot always be taken as a definite indication of the behaviour of the materials under plant conditions, but is useful and can be of guidance, for the establishment of knowledge of this kind has generally preceded developments in the application of material to chemical plant equipment.

While a consideration of them is outside the scope of the present article, ferrous alloys, especially of the iron-chromium, iron-chromium-nickel, and iron-silicon type, have been developed to withstand a wide range of corrosive substances, and these materials have proved, in actual practice, highly resistant to many corrosion conditions.

Of the pure metals used in the chemical industry, copper, nickel, lead and aluminium are the chief, and their applications are considered more fully later. Other pure metals, such as gold, platinum and silver, while in many instances much more resistant, are used to a less extent on account of cost. Tantalum is another metal in the same category, possessing good resistance to many substances, good physical properties, but the disadvantage of high cost. Silicon is very resistant to attack by several acids.

Lead

The resistance which lead offers to attack by sulphuric acid has long been known and made use of, especially in the manufacture of this acid. It is used in the form of linings and pipe. The metal resists attack by sulphuric acid in the cold in all concentrations, and possesses the merit of extreme ease of fabrication. In itself the metal is mechanically weak, and while it can be strengthened by the addition of hardening agents such as antimony, these lower its resistance to acid attack. In the handling of other mineral acids, lead is used to a limited extent, and also in connection with moist ammonia, concentrated acetic acid, acid sulphite liquors and phosphoric acid.

Aluminium

Aluminium is being used to an increasing extent for chemical plant. In general, the pure metal possesses better resistance to corrosion, and is therefore more generally applicable, than its alloys. The metal is hardly attacked at all by concentrated nitric acid, and in contact with this substance it is used in the form of tanks, pipes and drums (dilute nitric acid has some action). It is, however, liable to be corroded if impurities are present in the acid, and it is therefore used successfully with nitric acid made from atmospheric nitrogen but not with that made from saltpetre. It is also resistant to attack by concentrated acetic acid (above 90 per cent.), but is attacked to some extent by the dilute acid. In the handling of vinegar and acetic acid, aluminium is used in the form of tanks and pipes. The metal is generally of use when not exposed to the action of alkalies, halogen acids or salts.

The fact that its salts are colourless makes it useful in the preparation of paraffin wax for candles, kettles for varnish making, and drying trays in the dye industry; and the non-toxic properties of its salts render the metal of use in the preparation of foods and in dairy equipment. The metal is also resistant to attack by sulphur compounds, and this has led to its successful application in benzol refining, in the rubber industry as mandrils and moulds, and as tubes in sulphur wells. It is also being increasingly used in the brewing industry for vats and containers, for it is not attacked by the acid products of fermentation.

It is also used for stills in concentrating ammonia and as crystallising pans for ammonium sulphate. The metal is light, easy of fabrication and cheap, and equipment is usually

made from sheet, tubing and rod. When used in the form of castings, such hardeners as tin, manganese or silicon are frequently added. Aluminium equipment in common use in chemical industries includes stills, tanks, evaporators, trays, pans, autoclaves and condenser coils.

Copper

While copper is not regarded as a metal resistant to severe corrosive influences, it is quite widely used in chemical engineering because of its ease of fabrication, thermal conductivity and good mechanical properties. Its use in the form of stills in the alcohol industry is well known, and it is also used for milk evaporators, condenser equipment and kettles for the manufacture of confectionery.

It is not seriously attacked by products of wood distillation, such as methanol and acetone, and is used in handling these substances and in the manufacture of methyl acetate. It is also used in the handling of benzoic acid and paranitrophenol. Ammonia and its salts and nitric acid and some of its salts attack copper, while the action of organic acids is variable and depends on the temperature and the presence of water and air. Deoxidised copper in the form of tubes finds extensive application in condensers, evaporators, and various other kinds of plant, for the absence of oxide inclusions makes it more resistant to corrosive influences than ordinary copper.

Brasses and Bronzes

The ordinary brasses and bronzes do not resist any but comparatively mild corrosive influences. They stand up fairly well to hot solutions of sodium chloride and dilute sulphuric acid, but are corroded by other acids and many organic substances. The normal brasses, for certain purposes, have been modified by the addition of substantial amounts of nickel, and several alloys in this class are on the market under trade names. The compositions used vary within wide limits, and frequently appreciable amounts of such elements as iron and manganese form part of the alloys.

As a class, they are resistant to dilute sulphuric acid, caustic alkalies, salt solutions, chlorine bleaching solutions, organic acids and superheated steam. They are used as pump parts, in pickling equipment of various kinds, in salt evaporators, in the manufacture of caustic soda, and for valves and fittings in contact with superheated steam. These alloys are not resistant to nitric, chromic or hydrochloric acids or ammonium hydroxide.

Aluminium Bronzes

The aluminium bronzes possess good resistance to dilute sulphuric acid, alkaline solutions, many corrosive vapours, a wide range of organic substances, and acid mine waters. These alloys usually contain about 7 to 11 per cent. of aluminium and 1 to 3 per cent. of iron. Not uncommonly, small amounts of nickel and manganese are present. Being amenable to heat treatment, a very wide range of mechanical properties is obtainable with these alloys. Alloys of copper with silicon in comparatively small amounts, with or without manganese, are resistant to sulphuric acid, and, in the absence of air, to hydrochloric acid also.

These alloys possess good mechanical properties, and it seems likely that extremely useful alloys of this type may be developed, very interesting results having already been obtained experimentally by the addition of silicon to brasses and bronzes and to copper, with other elements such as chromium, manganese, nickel and iron. None of the copper alloys to which reference has been made are resistant to nitric acid, and most of them are attacked by hydrochloric acid.

Nickel

Nickel and its alloys occupy a prominent place among the non-ferrous materials used in chemical plant manufacture, because of their excellent corrosion-resisting and mechanical properties, and the readiness with which they can be worked. Several of the special brasses and bronzes already mentioned owe their improvement in properties to the addition of nickel, which, in a general way, improves their resistance to corrosion and exerts a densifying effect. This effect is well known in connection with the aluminium bronzes. Many of the newer non-ferrous alloys which are being developed to withstand corrosive influences contain appreciable quantities of nickel.

Nickel itself is resistant to alkalies, either fused or in solution, and many salt solutions. It is only attacked by such organic acids as tartaric, oxalic, citric and acetic after long periods of contact. It is attacked slowly by sulphuric acid and hydrochloric acid, but is not resistant to nitric acid or oxidising acids. The salts of nickel are non-toxic, and the metal is used for pans in the preparation of foodstuffs, and in the dairy industry for pasteurisers and tanks. Nickel stills are used for the electrolysis of caustic soda, in the manufacture of caustic soda, and in the handling of benzoic acid vapours.

Alloys of Nickel

Of the non-ferrous nickel alloys, the binary alloys with copper are the most widely used. They have found application as condenser tubes, where they withstand corrosion much better than brass tubes, in the fruit canning industry, dyeing tanks, laundry machines and soap manufacture. In the copper-nickel alloys, the resistance to corrosion increases with nickel content.

A well-known alloy of this series, for chemical and general engineering work, is the "natural" alloy known as Monel metal, which contains about 67 per cent. of nickel and 28 per cent. of copper, the rest being iron and manganese. This alloy is resistant to salt water, atmospheric conditions, ammonia, fused caustic and caustic solutions, fatty and many other organic acids, many salt solutions, mineral oils, phenol and cresol, fruit juices, bleaching liquors, dyes, acid mine waters, and black liquor from the sulphate paper process. It is also fairly resistant to sulphuric acid, hydrofluoric acid and chlorine, but not to hydrochloric acid, nitric acid, chromic acid, ferric chloride, potassium cyanide, hot picric and phosphoric acids, or certain oxidising salts. It is resistant to oxidation, and retains its strength well at moderately elevated temperatures. Consequently it has found extended use in the chemical industry in the manufacture of dyes, soaps, foodstuffs, alkalies, glue and paper, as fusion pots, centrifuges, baskets, screens, filters, evaporators, pumps, mixer shafts and tanks. It is also used successfully in various forms in pickling equipment, and in contact with superheated steam it is used in stop-cocks, valve stems and seats, and pump parts.

The alloys of nickel with chromium also possess good corrosion-resisting properties, but these alloys are at present better known in the applications where use is made of their resistance to heat and electricity. Recent work has shown that the nickel base alloys containing 60 to 70 per cent. of nickel with the remainder chiefly iron and chromium have their corrosion-resisting properties improved by the addition of small amounts of tungsten and molybdenum.

Other alloys which have been the subject of recent experimental investigation from the standpoint of corrosion resistance are those of nickel and molybdenum. The results obtained indicate that these alloys possess good resistance to hydrochloric acid, and it has been found that a proportion of the molybdenum can be substituted, without detriment, by iron, giving a composition of about 20 per cent. each of iron and molybdenum with the remainder nickel. Acid-resistng alloys of nickel, chromium and molybdenum have also been experimented with, and also alloys of nickel, aluminium, and silicon, but much more investigation is necessary before these alloys could be put forward as useful materials in chemical engineering.

The Patents Committee

THE committee which was set up under the chairmanship of Sir Charles Sargant to consider whether any amendments in the Patents and Designs Acts, or any changes in Patent Office practice, were desirable, are continuing their meetings at the Board of Trade for the purpose of hearing evidence from interested persons and associations. Four meetings of the committee took place before the vacation, and during the next few weeks evidence will be taken from representatives of Trade Marks, Patents and Designs Federation, Ltd., the British Science Guild, the London Chamber of Commerce, the International Association for the Protection of Industrial Property (British Group), the Association of British Chemical Manufacturers and the Chartered Institute of Patent Agents. Any persons or associations desiring to submit any further suggestions or to give evidence, are invited to communicate with the Secretary, Mr. R. W. Luce, Industrial Property Department, Board of Trade, 25, Southampton Buildings, London, W.C.2.

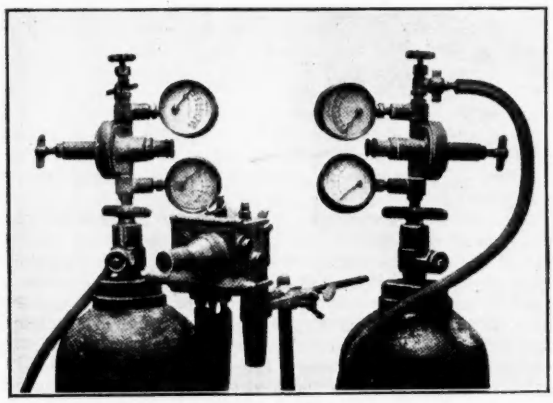
The Spraying of Metals

The Metallisation Process

METALLISATION, as its name implies, is a process by which articles are covered with a metal layer. Patents on the process are held by the Metals Coating Co., Ltd., which is taking over the activities of the companies formerly dealing with it. The latest process is a development of the Schoop method for the production of sprayed metal coatings. The following details have been supplied by the company.

Nature of the Process

Metallisation by the company's process consists of bombarding the surface to be metallised with thousands of tiny particles of metal in the form of a spray. The spray is formed and



THE PISTOL AND CONNECTIONS.

carried by a stream of compressed air which atomises a small globule of molten metal forming continuously at the end of a wire.

This dual process is accomplished by a special tool known as the "pistol." This is a small machine weighing approximately 3½ lb. The principle of the action of the pistol is simple, although its mechanism is somewhat complicated. A wire of the metal or alloy which it is desired to spray is passed at a steady speed through the tool. The feeding of the wire is automatic, because it is actuated by rollers in the pistol body, which, in turn, are driven by gears connected to a small air turbine, also contained in the pistol case. The wire feeds into the hot zone of an oxy-blowpipe flame, which is surrounded by a cone of compressed air. As quickly as the metal becomes molten, it is atomised by the air and the particles are driven forward on to the surface to be coated.

The Surface Treated

It is necessary here to say something of the surface to be metallised. Owing to the cooling action of the air stream, there is very little heat effect at the surface of the work. It is possible to spray the film side of a photographic negative without blistering it; and if the hand is held in the spray it is quickly coated with metal without any discomfort. Therefore cloth and paper can be metallised without trouble, but in the case of paper it is essential that the surface shall not be glazed. It is a *sine qua non* of the process that the surface sprayed must have an open texture, and with metallic surfaces this is obtained by sand-blasting. In the case of wood, if the surface is dry, sand-blasting can be avoided by rubbing with sandpaper, but it is advisable with large wooden articles to give a light sand-blasting if possible. Plaster and porcelain articles are best warmed to receive the spray, their surface, of course, being left unglazed.

Sprayed coatings can be applied to any desired thickness over 0·001 in., it being merely a question of the time of application of the spray. The finish of the sprayed articles is finely matte, and is pleasing for most purposes; but if a polished surface is desired the coatings may be buffed in the usual way. The process is, therefore, applicable for coating of metal on any articles from celluloid to steel, and the sprayed layer may be of any metal or alloy which can be drawn into wire and which is capable of being melted in the blowpipe flame.

Sand-Blasting

As already explained, it is essential that the surface to be metallised be of an open texture, and thoroughly clean; that is, free from moisture, oil, and scale. With metallic articles this condition is obtained by sand-blasting, which should be carried out immediately before spraying, so that there is a minimum risk of troubles due to moisture. To get a sufficiently open grain it is necessary to use a heavy pressure and specially hard sand. The air pressure used is 30 lb. per square inch, and the sand is black flint of 20 mesh grade. Ball shot is not satisfactory, as the final surface is not open enough, but angular shot can be used. It is essential in all sanding processes that the sand should be dry. For most purposes a $\frac{5}{16}$ in. nozzle is used, consuming about 100 cu. ft. of air per minute, and on straightforward work one man is able to blast 35-40 sq. ft. in one hour.

For woodwork and plaster it is necessary, of course, to reduce the pressure to 10 lb., or even less, and to use sand of a finer quality or sand which has been broken up by continued use on metal.

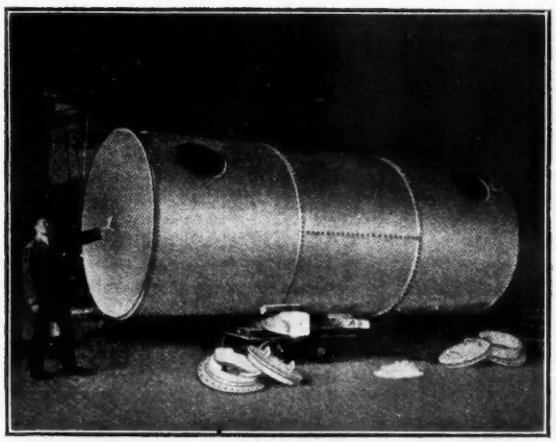
Where possible, the spraying process is carried out immediately after blasting, as moisture and traces of rust impair the adherence. Where it is not possible to spray immediately with the finishing layer it is usual to sandblast and then spray the article with a film of zinc of a minimum thickness (0·001 in.). This prevents rusting and enables the work of spraying to be carried out in stages.

Metal Wire Used

The wires used are specially prepared for the process by Charles Clifford and Son, Ltd., Fazeley Street Mills, Birmingham, and are of the following gauges:—

Tin, lead, and zinc	1·5 mm.
Zinc, aluminium, copper, bronze, brass, and nickel	1·0 mm.

The wire is wound on spools containing about 60 lb. of zinc, the weights of the other metals being in proportion to their specific gravity. The reels are placed on a stand and rotate freely on a spindle fitted with ball bearings. The turbine in the pistol will then pull the wire from the spool automatically. The lid of the pistol is lifted and the end of the wire is passed



STORAGE TANK COATED ALL OVER WITH ALUMINIUM.

through the guide at the back of the tool over the toothed roller in the body and through the hole in the centre of the pistol nozzle, and the pistol is then ready to light. Two sizes of wire nozzle are used to take the gauges of wire specified above.

The pistol has three connections for flexible rubber tubes, all three pipes being controlled by one master valve. The

three pipes are for the conveyance of the feeding gases, which are :—

1. The larger connection for compressed air, 45-50 lb. pressure.
2. Centre pipe for compressed combustible gas. In most cases coal gas compressed in a small compressor to 25 lb. per sq. in. is cheapest, but hydrogen or coal gas or acetylene may be used from cylinders.
3. The other pipe is for the conveyance of oxygen from cylinders. Cylinders containing 100 cu. ft. of gas are used.

The combustible gas and oxygen pass through the pipes in the aluminium casting of the body to a mixing chamber in the nozzle, and are led through small ducts on the outer surface of the wire nozzle to the jet, where they burn, the wire feeding down the centre of the flame. The compressed air passes through a valve in the case and part of it goes straight into a chamber and thence flows in a stream round the gas jet, and this atomises the molten metal formed in the flame. The other portion of the stream of air—the quantity being controlled by a screw valve on the side of the pistol—passes into the turbine chamber. A small aluminium turbine here is rotated at an average speed of 15,000 revs. per minute on ball bearings ; the speed of this is, of course, dependent on the air passing, which is regulated by the valve. It is, therefore, this valve which regulates the speed of the wire feed through the changing speed of the turbine. The air from the turbine chamber passes into the gear chamber and escapes through the various orifices in the pistol box.

It will be seen that this escaping air will cool by expansion, and if the compressed air contains moisture there is a tendency for this to condense in the gear chamber, and this causes trouble in working ; it is, therefore, necessary to dry the air used, and this is accomplished by cooling. It is then advisable to reheat slightly by placing a few gas jets under the pipe line.

It is necessary to connect the various sources of supply to the pistol with lengths of about twenty feet of rubber pressure tubing.

Consumption of Wire and Gases

The approximate consumptions of wire and gases are given in the following tables :—

USING COAL GAS.

Metal.	Diameter of Wire mm.	Weight per sq. ft. per ·001" oz.	Metal sprayed per hour lb.	Metal deposited per hour lb.	Oxygen. Cubic ft. per hour	Oxygen. Pressure : lb. per sq. in.	Coal Gas. Cubic ft. per hour	Coal Gas. Pressure : lb. per sq. in.
Lead	1·5	0·0938	14·000	11·000	30	24	45	24
Tin	1·5	0·601	6·000	4·500	25	20	38	20
Zinc	1·5	0·663	5·500	4·250	33	26	48	26
Aluminium	1·0	0·211	1·250	1·000	36	30	54	30
Copper	1·0	0·732	1·125	0·875	45	32	67	32
Bronze	1·0	0·732	1·125	0·875	45	32	67	32
Brass	1·0	0·710	1·250	1·000	45	32	67	32

USING HYDROGEN.

Metal.	Diameter of Wire mm.	Weight per sq. ft. per ·001" oz.	Metal sprayed per hour lb.	Metal deposited per hour lb.	Oxygen. Cubic ft. per hour	Oxygen. Pressure : lb. per sq in.	Hydrogen Cubic ft. per hour	Hydrogen Pressure : lb. per sq. in.
Lead	1·5	0·938	16·000	12·500	23	16	67	15
Tin	1·5	0·601	7·500	5·250	20	15	50	14
Zinc	1·5	0·663	6·500	5·250	25	16	70	15
Aluminium	1·0	0·211	1·500	1·250	28	20	70	15
Copper	1·0	0·732	1·250	1·000	32	20	75	17
Bronze	1·0	0·732	1·250	1·000	30	20	70	17
Brass	1·0	0·710	1·375	1·125	30	20	70	17

The consumption of air is about 15 cu. ft. per minute. The pistol is held so that the spraying distance is between 3 in. and 5 in., and the spray should strike the work at right angles.

A certain amount of sprayed metal is disseminated into the air as a fine dust, which is very harmful to the health of the operators ; special respirators are used to overcome this difficulty. In all cases where lead, tin, and copper are sprayed a good exhaust is absolutely essential. When working in a confined space, the operator should be protected with a respirator from which he breathes only pure air.

Licences are granted for the use of the metal-spraying pistols in the licensee's own works and on work of their own manufacture. The licences give the right to work under the patents in England. Demonstrations can be arranged for by appointment.

The variety of metals which may be sprayed may be inferred from the tables given above. Zinc coatings, for example, may be used on iron and steel for protection against rust. Coating with tin has a large field of usefulness in plant, etc., for use in the food production industries. Aluminium coating is of value in the same industry, as well as in the oil and chemical industries. The value of coatings of nickel, copper, brass, etc., is also obvious. It may be noted that, providing the surface to be covered is large enough, all coatings can be carried out *in situ* by portable plants.

British Road Tar Exhibit

AT the Public Works Roads and Transport Exhibition at the Royal Agricultural Hall, London, November 18 to 23, the British Road Tar Association will be represented at Stand No. 57, Main Hall. The Association's stand can be looked upon as being an information bureau wherein all those interested in the use of tar will have an opportunity of discussing questions concerning its use and application for road-making. Samples of road tar, in accordance with the Association's specifications, will be seen, and among the exhibits is an interesting section of Roman road, which, in contrast to the modern sections of tarred roads, will show the development that has taken place in road construction since the Roman period. The Association's tar viscosity demonstration apparatus will again be featured. This at a glance gives an indication of the desirable properties in tar for road-making purposes. Literature on the tar treatment of roads will be available at the stand.

To itemise the advantages of British tar for modern road surfaces is no easy task. Special mention, however, must be made of the non-skid surface of the tarred road (a feature in these days of alarming skidding accidents), which is essential for public safety. In view of the huge expenditure on roads at the present time, any economical form of maintenance is of importance. A real saving can be effected by the conservation of existing roads. The use of British tar has lengthened the life of thousands of miles of roads in Great Britain. It is easily applied with non-skilled labour under skilled supervision. A cordial invitation is extended to surveyors and other interested people to pay a visit to the stand.

Gas Fires and Their Settings

SIR LAWRENCE WEAVER'S very attractive volume under this title (Fanfare Press, London) deals chiefly with "the æsthetic development of the design and setting of gas fires," and is intended especially to attract the attention of architects to the subject. As a fundamental principle emphasis is placed on the outstanding importance of providing every room in every building with a flue and of installing only such systems of heating as require a flue. Sir Lawrence's view is that the inset fire, or the gas interior, or the built-in fire, whichever name may be preferred, is æsthetically a right type, and that the self-contained fire, necessarily standing forward from its surround presents very serious disadvantages. The difficulty has been that in most cases the gas fire is a sort of afterthought ; very often a mere substitute or adaptation. The case here is that gas, as a method of heating in the form of an open fire, is as distinct from burning coal in an open grate as electrical heating is distinct from gas heating. This, of course, implies that gas heating should now be considered as a separate system altogether, and designed without regard to the established conventions associated with coal fires. What makes the volume so attractive is the series of illustrations of gas fire-places, installed both in modern houses and in Georgian and other types of older houses. These show what an enormous advance has been made in recent years in gas fire design and in the development of the radiation idea, and they constitute, with the author's text, a persuasive case from the gas point of view.

Society of Public Analysts

THE next meeting of the Society of Public Analysts will be held on Wednesday, November 6, at the Chemical Society's Rooms, Burlington House, Piccadilly, at 8 p.m. The following papers will be read : "The Grouping of Fatty Oils, with Special Reference to Olive Oil," by E. R. Bolton and K. A. Williams ; "The Heat Resistance Curve : a New Bacteriological Test for Pasteurised Food," by Dr. C. Dukes ; "A New Borax Solubility Test for Lactic Acid or Natural Sour Casein," by W. R. Mummery and F. Bishop.

Locust Beans in the Textile Industry

A Paper Before the Society of Dyers and Colourists

A MEETING of the Manchester Section of the Society of Dyers and Colourists was held on Friday, October 18, in the lecture room of the Manchester Literary and Philosophical Society, Mr. G. E. Holden presiding. A paper entitled "The application of the Locust Bean in the Textile Industry, and especially in the Calico Printing Trade," was read by Dr. G. Tagliani, of Basle.

Dr. Tagliani said that there was a very complex substance obtained from the locust bean which had for some time past been of great use in the textile industry, and which might be classed with the gel-like bodies which occurred in linseed and other seeds. In England, the locust bean seed gels had long been used in the textile industry, and most of those engaged in it were acquainted with the phenolic-smelling Tragasol. In the solid powder form, Tragasol would be recognised in Tragon, and in a number of similar products, under the names of Cefen, Diagum, Star Gum, Purogum, Neogum, Fructan, etc., would be found evidence of the importance of this product in weaving, printing, finishing, and other processes.

Gum-like Substance

Dr. Tagliani then dealt with the behaviour and the practical value of the gum-like substance in the seeds of the locust bean for the purposes of the textile industry, and, in particular, its value in the printing of woven fabrics. In this connection, it was necessary to examine not only the use of the prepared gels as a thickening in general, but also, and especially, their behaviour as carriers of chemical substances. For a thickening to be of practical value, it must be capable of carrying the various agents required in printing without any decomposition occurring and, further, dyestuffs printed in its presence must not diffuse beyond the boundaries of the printed pattern.

It was essential also that the print-paste should penetrate easily the underlying fabric, and that the chemicals and dyestuffs contained therein should be transferred readily from the thickening to the fibre. It could be stated generally that the greater the content of thickening agent in a print-paste, the grosser would be the dispersion of the various compounds in the thickening, and the slower and more difficult would be their fixation on the fibre.

It might often happen that the whole of these desiderata could not be achieved, and that, in consequence, a modification of the print-paste was called for. That such modification was permissible was self-evident.

Content of Thickening

On the other hand, the lower the content of thickening agent in a printing-paste, the thinner would be the layer of thickening which lay between and in the fibres and, in consequence, the purer, deeper and more level after steaming would be the colours carried thereby. It was of great importance also that such a thickening, after fulfilling its temporary service, should be removed rapidly and completely by washing. The endosperm of the locust bean fulfilled to a very large extent the prescribed conditions of a satisfactory thickening. It must be recognised, however, that in view of the low solid content of glutinous material in the prepared gel, its adhesive properties would not be of the highest order.

The aqueous gels of commerce prepared from the ground seed of the locust bean differed from the natural Tragasol gel and exhibited a fluidity more like a gum solution. They could readily be mixed with the majority of products required in printing. Dr. Tagliani stated that he had used 4 and 5 per cent. gels, and had submitted them to the action of a wide range of chemical reagents, under the influence of heat, and that he had subsequently examined the result after twelve or more hours' interval. More highly concentrated gels, which were best prepared in an autoclave under pressure, and which resembled a thick gum solution, gave essentially the same results.

The various products in powder form which occurred in commerce did not always give similar homogeneous and viscous thickenings, in part probably because of differences in their technical preparation, and in part because of the varying degree of fineness of the respective powders. The higher the temperature and the longer the time of extraction, the more transparent, gum-like and fluid would be the resultant gel, and the less would be the danger of a lowering of the viscosity as a result of fermentation. If a normal thickening prepared from the endosperm was allowed to stand until it reacted acid to litmus paper and showed a pronounced loss in viscosity, and if then a high addition of concentrated alkali was made to it, it would be found that there was no longer any tendency for the mass to coagulate to a jelly. It therefore followed that such fermented gels could be usefully employed in many cases.

Institute of Chemistry

Pass List for September Examinations

Examination in General Chemistry for the Associateship :—Bell, James Alfred, Royal Technical College, Salford ; Chirnside, Ralph Clark, Rutherford Technical College and Chelsea Polytechnic ; Ellenberg, William, Chelsea Polytechnic ; Elwes, Eric Vincent, Central Technical School, Liverpool, and The Technical College, Leeds ; Jones, John Mather, Birkbeck College, London ; Nutter, Arnold, A.M.C.T., College of Technology, Manchester ; Rattray, Edwin John Thomas, Royal Technical College, Salford, and Central Technical School, Liverpool ; Robinson, Edmund Brodie, B.Sc. (Lond.), University College, Nottingham ; Savidge, Leslie Noel, College of Technology, Manchester ; Schofield, Harry Fryer, A.M.C.T., College of Technology, Manchester ; Weston, Bernard Allan, West Ham Municipal College, and Birkbeck College, London ; Winstanley, Arthur, A.M.C.T., College of Technology, Manchester.

In Branch E : The Chemistry, including Microscopy, of Food and Drugs, and of Water :—Bunce, Edwin Herbert ; Elvidge, Wilfred Farrand, B.Sc. (Lond.) ; Stern, Isaac, B.Sc. (Lond.) ; Warren, William, B.Sc. (Lond.) ; Williams, Hugh Amphlett, A.C.G.F.C. ; Wood, Robinson Pearson, M.Sc. (Dun.).

In Branch F : Agricultural Chemistry :—Jones, Daniel Evans, M.Sc. (Wales), F.I.C.

In Branch G : Industrial Chemistry :—Charap, Myer Martin, B.Sc. (Lond.) ; Taylor, Henry Frankland ; Wilshere, Lawrence Arthur, A.C.G.F.C.

In a Special Examination in Refining and Testing of Petroleum and its Products :—Maung, Maung, B.Sc. (Calcutta), A.R.C.S.

New Plant for Sewage Works

Ministry of Health Inquiry at Huddersfield

A MINISTRY OF HEALTH inquiry took place at Huddersfield on Thursday, October 17, relative to the application of the Corporation for consent to the utilisation of £24,125 for an additional unit at the sewage works, out of the as yet unspent balance of £133,000 already sanctioned by the Ministry.

Alderman Berry said that the West Riding Rivers Board had, for some time, been urging the Corporation to proceed with further bio-aeration units, and had served them with the usual two months' notice of their intention to take legal proceedings against them on the ground of river pollution. "We consider," said Alderman Berry, "that the Rivers Board have not been fully acquainted with the difficulties with which we have had to contend regarding the treatment of the chemical effluents, and we are of opinion that we ought to have a little more time to complete our investigation of these chemical effluents and their effect on the general sewage."

In closing the inquiry, Dr. Calvert, representing the Ministry, said that it appeared that a new plant, if sanctioned, would certainly not be wasted.

River Pollution Allegation Against Sugar Factory

THE Central Sugar Co., Peterborough, has notified its growers that no more beets will be accepted for several days, and at the same time nearly 100 employees have been temporarily laid off. Captain Mowbray, managing director, states that this action has been taken because it is understood the company is likely to be proceeded against for alleged pollution of the River Nene by the Nene and Welland Fishery Board ; and in view of the uncertainty of the position, the management has decided to postpone acceptance of any more beets until the position develops so that they can judge whether or not the threat is serious. Weighbridges at the factory were opened this year on September 16, and since that time more than 35,000 tons of beet (or about half the crop contracted for) have been received, for which the growers will receive £103,600. The difficulty seems to be that there is very little water in the river.

Portland Cement and Limestone Products

Petition for Compulsory Liquidation

IN the Chancery Division on Monday, Mr. Justice Romer had before him a petition by J. Dawson Fawcett (Darlington), Ltd., Haughton Engineering Works, Darlington, judgment creditors, for the compulsory liquidation of the Portland Cement and Limestone Products, Ltd.

Mr. Harman, for the petitioners, stated that the petition was opposed by a creditor, who took the view that as one of the assets of the company was a mining lease which contained a proviso for forfeiture in the case of liquidation, the petition should stand over to enable the lease to be disposed of before the company was wound up. That view appealed to him, and he asked for an adjournment and the appointment of the Official Receiver as provisional liquidator, but he understood that contributories supporting the petition were pressing for a winding-up order.

Mr. Cecil Turner, for shareholders, supporting the petition, said they had substantial claims against the directors, and that attempts had been made for the best part of a year to dispose of the lease without success. He would, however, be protected by the appointment of a provisional liquidator.

Mr. Gedge, for the opposing creditor, said his sole object was to sell the lease. He was just as anxious as the other creditors that the company should be wound up.

Mr. Justice Romer appointed the Official Receiver as provisional liquidator, and adjourned the petition for four weeks.

Butyl Alcohol in France

THE French production of butyl alcohol is, at present, from 900 to 1,000 metric tons annually. Of this production almost 400 metric tons are used in the form of butyl alcohol, while most of the remainder is transformed into butyl acetate. The principal French producer of butyl alcohol is the Distillerie des Deux-Sèvres at Melle.

In addition to the domestic production, it is necessary to import fairly large quantities of butyl alcohol. These imports, as will be seen from the following detailed table of imports, come largely from Germany, where they are manufactured by the I.G. French exports of butyl alcohol are insignificant.

	1928		1929 (6 months)	
	Quintals.	Francs.	Quintals.	Francs.
Germany	2,300	1,833,000	1,570	1,144,000
England.....	277	193,000	6	7,000
United States	627	419,000	—	—
Total	3,204	2,433,000	1,576	1,151,000

(One quintal equals 220·46 pounds.)

The price of butyl alcohol in France is approximately 10.50 francs per kilo loaded, and for butyl acetate, 11.50 francs per kilo loaded. The above prices are for large orders, and small consumers must usually count on paying from 15 to 20 per cent. more.

German Match Monopoly

RECENT negotiations between Swedish match interests and the German Government for the grant of a match monopoly in Germany have now been completed. Higginson and Co., fiscal agents of the Swedish Match Co., state in an announcement that a definite agreement was signed on Monday between the German Government and the Swedish Match Co. and N.V. Financieele Maatschappij Kreuger and Toll, whereby the sole right in Germany for the sale, export, and import of matches has been transferred to a special monopoly company for a minimum of thirty-two years and a maximum of fifty years, depending on the time of repayment of the loan granted to the German Government in this connection. One half of the shares in the monopoly company will be held by Swedish Match Co. and International Match Corporation, the remaining half by the German factories and Reichs Kreditaktiengesellschaft. The Swedish Match Co., as before, controls about 65 per cent. of the German match production, and German factories about 35 per cent. In connection with this agreement, N.V. Financieele Maatschappij Kreuger and Toll will grant the German Government a loan of $125,000,000 at 6 per cent., to be taken over at 93 per cent., but with right of conversion at par after ten years. The agreement is subject to the German Reichstag's ratification and to German acceptance of the Young Plan.

British Metallising Co.'s General Meeting

THE first ordinary general meeting of British Metallising Co., Ltd., was held on Friday, October 18, at River Plate House, London. Mr. F. Heron Rogers, the chairman, presided.

The chairman dealt with the origin and working of the company up to date. The accounts covered, he said, a period from the incorporation of the company to June 30 last. He expressed his confidence in the future of the undertaking and the prospects generally. After giving particulars of the development in various directions, he said that important negotiations were in progress as to the sale of the American and Canadian rights. The works at home had proved too small, and they had lately acquired a factory at North Acton which would fulfil all their requirements. The directors had received a proposal—which it was suggested should be made to the shareholders—from the Metals Coating Co., Ltd. That proposal embodied the offer to exchange one £1 cumulative 7½ per cent. participating preference share in the company, the participation being as to 40 per cent. in the remaining profits after 7½ per cent. had been paid on the "B" ordinary shares, together with the right to apply for the allotment of one ordinary "B" share of 5s. each for every £1 preference share held in Metals Coating, Ltd. That proposal was made on behalf of the Metals Coating Co., Ltd., through Anglo-Scottish Securities, Ltd., which company had already undertaken to acquire over 20 per cent. of the shares of the company. The Metals Coating Co., Ltd., was a nominal registration which would automatically enlarge its capital to £500,000, which would be dealt with in the manner described to the shareholders.

After a brief discussion, generally in favour of the proposal, the report and accounts were adopted.

Chemical Engineering Group at Nottingham

THE Chemical Engineering Group will hold a joint meeting with the Nottingham Section of the Society of Chemical Industry on Thursday, November 14. During the day the science buildings of the University and the works of Manlove, Alliott and Co., Ltd., will be visited. In the evening there will be a meeting at the Victoria Station Hotel, Nottingham, when Mr. J. Arthur Reavell will read a paper on "The Scientific Heating of Liquids and Gases," which will deal with general principles, the transfer of heat from gas to liquid, the practical use of heat exchange, and the adaptation of high-temperature heat transfer with oil as the medium. Mr Reavell has made an exhaustive study of this question, and the paper will form an authoritative statement on the subject. For those who wish to spend the day in Nottingham there is a train leaving St. Pancras, London, at 11 a.m. For those who wish to attend the meeting in the evening there is a train at 3.30 p.m.

Protection Against Mercury Fumes

FOR protection against mercury, says the *Chemiker-Zeitung*, especially in the electrochemical industry, filters containing gold have proved of value. The substances used as filters are wadding, cellulose and various granular substances of large surface, covered with an extremely attenuated layer of colloidal gold. The basic material is soaked in a dilute solution of a gold salt, and by means of a reducing agent the gold salt is then reduced to gold. Alternatively, the gold may be sprayed on by Schoop's process. The "gilded" material is fitted into a gas-mask filter. For workers in laboratories where mercury fumes may arise the use of wadding covered with gold is recommended, the wadding being inserted in the nostrils.

Red Oxide from the Persian Gulf

RED oxide is mined at the island of Hormuz, in the Persian Gulf. The island is situated at the entrance to the Gulf, opposite the Persian town of Bunder Abbas. The composition of the island is partly of red oxide and partly of salt. Hormuz red oxide is mined under a concession granted by the Persian Government to Hadji Agba Mohammad Bushiry, Avenue Salezar, Teheran, Persia. Two steamship lines run to the Persian Gulf, one operated by a British firm, Frank C. Stuck and Co., Ltd., of London, and the other the German Hansa Line, Bremen.

From Week to Week

DR. E. F. ARMSTRONG, F.R.S., has joined the board of Sensible Heat Distillation.

THE PUMPING OF BRINE across the Cheshire border to feed chemical works in Widnes is said to be under consideration.

SIR JOHN BUTTERS, Sir John Harrison, and Major R. P. Sims have been elected to the Board of Australian Benzol and Coal Distillation, Ltd.

FATAL INDUSTRIAL ACCIDENTS reported in Great Britain and Northern Ireland during September included three in chemical factories.

THE CHEMICAL SCHEDULES in the new United States Tariff Bill were strongly criticised in the Senate on Tuesday by both Democrats and Republicans, the critics including Senator Lafollette.

IMPERIAL CHEMICAL INDUSTRIES, LTD., states a Berlin message to *The Liverpool Post*, has purchased a 25 per cent. interest in the 12,000,000 marks (£600,000) capital stock of the Hirsch copper and brass works, situated at Everswalde, near Berlin.

THE GRASSELLI MEDAL for 1929 has been awarded to Professor Bradley Stoughton, and the formal presentation will be made on November 8, 1929, at the Chemists' Club, New York. The award is made for a paper on " Light Structural Alloys " presented several years ago.

THE MINISTRY OF HEALTH have issued a report on swimming baths in which it is stated that the evidence that various diseases are occasionally, though infrequently, transmitted by the water in the baths appears convincing. Various methods of purification of bath water are advocated, including natural purification, treatment by chemical means, continuous filtration, and chlorination.

E. KLEIBER, OF BASLE, claims to have produced synthetic rubber from mineral oils and their waste products. Patents for the Kleiber process are said to have been taken out in all European countries, in Canada, the United States, and Japan. A German consortium has been formed for the purpose of manufacturing and marketing the Kleiber synthetic rubber on a commercial basis.

AN ACCIDENT AT Synthetic Ammonia and Nitrates, Ltd., Billingham, on Tuesday, resulted in the death of Thomas H. Larkman. With two other men he was wheeling a heavy wheel over the floor of a sulphate plant building. The wheel passed over a rubber-covered electric cable and the rim pierced the insulator, giving the three men an electric shock from which Larkman did not recover.

AT AN INQUEST held at Sunderland on Thursday, October 17, on Sidney Ward, aged 12, it was stated that the boy picked up what he thought was a yellow stone, which lay steaming on the beach at Roker. He put it in his pocket, and soon afterwards his clothes caught fire, and he was fatally burned. Dr. Tweddle, house surgeon at the hospital where the boy died, said that he was of opinion that the burns had been caused by phosphorus. A verdict of death by misadventure and accident was returned.

UNEMPLOYED INSURED PERSONS in the chemical industry at September 23 in Great Britain numbered 6,497 (males 5,810, females 687); in the explosives industry, 1,010 (males 727, females 283); in the manufacture of paint, varnish, japan, red and white lead, 836 (males 663, females 173); and in the manufacture of oil, grease glue, soap, ink, matches, etc., 5,087 (males 4,157, females 930). The percentages of insured unemployed in these industries in the above order were 6·5, 5·0, 4·5, and 6·7 respectively.

THE CHAIRMAN OF BRITISH GLUES AND CHEMICALS, LTD., announces that Mr. Roger Duncalfe has expressed the wish, now the company has turned the corner, to lay down the burden of executive work associated with his position of joint managing director. The board have agreed to Mr. Duncalfe's request, and Mr. H. J. Cotes will continue as sole managing director, but Mr. Duncalfe will remain a director, and has agreed to devote a considerable portion of his time to the interests of the company in a consultative capacity.

THE GERMAN CUMARONE RESIN CARTEL (Cumaronharz-Verband G.m.b.H.), Bochum, announces that the 1928 production by its members was 6,550 metric tons, against 7,625 tons in 1927. Sales from this production amounted to 5,948 metric tons, against 7,538 tons the previous year. The falling-off in 1928 sales compared with 1927 is due to lessened consumption by large users. Prices dropped from the beginning of 1928, when they were about 10 marks per 100 kilos, to a level of 8 marks at the end of the year. In certain grades of cumarone resin the price drop was less. Falling coal tar prices this year forecast an even greater weakening of cumarone resin prices.

MR. C. M. DOWSE, chief assistant in the engineering department, Northampton Polytechnic, London, when giving evidence before the Board of Trade Committee on Coal Gas Poisoning on Tuesday, asked if the possibilities of irritants introduced into coal-gas supplies had been fully explored. What was needed, he thought, was the introduction of a gas in small quantities which would produce coughing and sneezing or, at any rate, some discomfort which would waken a sleeper, or make deliberate breathing of the gas very difficult. Or was it possible to make the smell stronger? Professor Wheeler assured Mr. Dowse that there were experiments on irritants proceeding on a considerable scale in America.

MR. R. C. STANLEY and Mr. W. B. Lawson, of the International Nickel Co. of Canada, have been elected directors of Henry Gardner and Co.

DR. G. O. CURME, JR., Mr. H. E. Thompson, and Mr. R. W. White have been elected vice-presidents of the Carbide and Carbon Chemicals Corporation, of New York.

MAISELS PETROLEUM TRUST has acquired the Neath Abbey Patent Fuel Works, Neath Abbey, Glam., together with all plant and machinery, railways, sidings, etc., in working order.

LORD PARMOOR, the Lord President of the Council, as the Minister in charge of the Department of Scientific and Industrial Research, paid a visit of inspection to the Fuel Research Station at East Greenwich last week.

DISEASES OF OCCUPATIONS recorded in Great Britain and Northern Ireland during September under the Factory and Workshops Act, included three cases of aniline poisoning, one case of benzene poisoning and six cases of chrome ulceration (three in dyeing and finishing).

A TEMPORARY CESSATION of work has arisen at a chemical factory which was recently opened at Gretna, due to a decision of the management slightly to reorganise the concern. The company is to supply electric lighting to the township, and preparations for this are so well forward that the public lighting of the streets is expected very shortly.

MR. W. S. EYRE, director of Grace Brothers and Co., Ltd., and of the Peruvian Corporation, Ltd., has been appointed chairman of Ruths Steam Storage, Ltd., in place of Mr. F. E. Powell, who has resigned on account of claims made upon his time in America. Ruths Steam Storage also announces that Thames Board Mills has ordered a steam accumulator to be installed at Purfleet.

DR. H. E. HOWE, editor of *Industrial and Engineering Chemistry*, Washington, who made so many friends during the visit of the chemical engineers to Washington last year, had the misfortune to fall and break his arm at a recent meeting of the Institute of Politics, Williamstown, Mass. In announcing the fact, *The Percolator*, the lively little organ of the New York Chemists Club, says that " H. E. H. can still use the injured hand for talking purposes."

A CO-OPERATIVE AUSTRALIAN COMPANY has recently (according to a report from the U.S.A. Assistant Trade Commissioner in Sydney) reduced the price of superphosphate by five shillings per ton. This reduction is expected to bring about a corresponding reduction by other companies, including those who are members of the recent merger. The reduction is hailed by farmers and graziers, who have had hopes of such a reduction, as a result of the recent Tariff Board inquiry.

" THE INDUSTRIAL AUSTRALIAN AND MINING STANDARD " states that the directors of the Australian Radium Corporation N.L. have been advised by their London representative that good progress is being made with arrangements for the merger with the Cornwall and Czechoslovakia companies. Titles and leases, however, were required in London before the purchase money could be paid. Owing to delay in completing final details and sealing the option agreement, the term of the option was extended to October 4.

AN INQUEST was held at Middlesbrough, on Monday, on Alfred Roberts (31), a joiner, of Lincoln Street, Middlesbrough, who was employed at the Billingham works of Synthetic Ammonia and Nitrates, Ltd. It was stated that Roberts died from burns after slipping into a vat of ammonium sulphate solution which was nearly boiling. When he was being dragged out he seemed to have lost control of himself, and he twice slipped back. There seemed no possible reason why Roberts should go near the vat. The jury returned a verdict that death was in accordance with the medical evidence, but were unable to express an opinion as to the cause of the accident.

THE U.S. BUREAU OF MINES, as the result of recent investigations, has arrived at the conclusion that the carnotite ores of Colorado are worth exploitation for the purpose of producing radium, uranium, and vanadium. The ores were worked during the war, but the operations broke down in the face of competition of radium produced in the Belgian Congo. It is now believed that the latter deposits are by no means so extensive as was formerly supposed. The Bureau of Mines estimates that from the Colorado carnotite radium could be produced at a cost of $22,000 a gram, as compared with the present market price of $70,000. The cost of the radium produced at Colorado during the war was $37,599 a gram, but improvements in the methods of extraction would, it is thought, lead to the lower cost suggested above.

Obituary

MR. JOHN THOMAS FAIRS, for over twenty years employed at the works of Imperial Chemical Industries at Widnes, on Tuesday, October 22, aged 55.

MR. ARTHUR J. THOMPSON, on October 19, at 157, Rosebery Street, Liverpool. He had been a member of the staff of Evans, Sons, Lescher and Webb, Ltd., for nearly forty years.

MR. GEORGE WILLIAM LAWRENCE, for nearly 40 years an engineer in the service of Typke and King, Ltd., Crown Chemical Works, Mitcham, Surrey, at the age of 75. The funeral took place at Mitcham Parish Churchyard on Monday, October 21.

References to Current Literature

British

ANALYSIS.—The identification of apiol. J. King. *Analyst*, October, pp. 567–573.

The preparation and properties of xanthydrol as a reagent for urea. F. G. Kuy-Jones and A. M. Ward. *Analyst*, October, pp. 574–575.

Electrometric determination of copper. II. Application of Volhard's method to electrometric analysis. M. E. Pring and J. F. Spencer. *Analyst*, October, pp. 576–581.

GENERAL.—The action of air on flowers of sulphur and ground sulphur. J. E. Stephenson and S. W. Bridge. *Analyst*, October, pp. 590–591.

The action of caustic soda on wool. J. B. Speakman. *J.S.C.I.*, October 18, pp. 321–324T.

ORGANIC.—The action of nitrous acid on amino-compounds. III.—Dimethylamine, *n*-propylamine, and glycine ethyl ester. T. W. J. Taylor and L. S. Price. *Journal Chem. Soc.*, September, pp. 2052–2059.

Halogen substitution products of 4-aminobenzophenone. W. A. Waters. *Journal Chem. Soc.*, September, pp. 2106–2111.

Piperitone. IX.—Some oxidation reactions of piperitone. J. Read, A. J. Watters, G. J. Robertson, and R. S. Hughesdon. X.—The synthesis of certain menthadienes, menthenes, and menthanols. J. Read and A. J. Watters. *Journal Chem. Soc.*, September, pp. 2068–2076, 2165–2172.

SOILS.—Studies in soil genetics. I.—H. T. Jones and J. S. Willcox. *J.S.C.I.*, October 4, pp. 304–308T. Several Millstone Grit profiles are described and evidence is adduced that these profiles belong to the "podsol" class. The various current theories of iron pan formation are briefly discussed.

United States

ANALYSIS.—Reduction reactions with calcium hydride. I.—Rapid determination of sulphur in insoluble sulphates. W. E. Caldwell, W. F. C. Krauskopf. *J. Amer. Chem. Soc.*, October, pp. 2936–2942. Alkaline earth and alkali sulphates may be reduced quantitatively to sulphides by means of calcium hydride (fusion). In the fusion residues, the sulphur may be determined by iodine titration.

The determination of aluminium in plants. II. Aluminium in plant materials. O. B. Winter and O. D Bird. *J. Amer. Chem. Soc.*, October, pp. 2964–2968.

Monobromoguaiacol carbonate. Estimation of guaiacol carbonate. L. H. Chernoff. *J. Amer. Chem. Soc.*, October, pp. 3072–3074.

APPARATUS.—Experimental application of automatic *p*H recorders to sugar-alkalinity control. A. L. Holven. *Ind. Eng. Chem.*, October 1, pp. 965–970.

ASBESTOS.—Application of X-rays in the classification of fibrous silicate minerals commonly termed asbestos. H. V. Anderson and G. L. Clark. *Ind. Eng. Chem.*, October 1, pp. 924–933.

AZO-DYES.—A cleavage of azo-dyes by means of sulphites. K. H. Engel. *J. Amer. Chem. Soc.*, October, pp. 2986–2994. Monoazo dyes combine with two molecules of a neutral sulphite suffering cleavage into a primary amine and the salts of N-sulphonic and N-disulphonic acids.

CELLULOSE.—The fractional precipitation of cellulose acetate and some properties of the fractions. J. G. McNally and A. P. Godbout. *J. Amer. Chem. Soc.*, October, pp. 3095–3101.

CONCRETE.—Effect on concrete of acid water from stored bituminous coal. E. F. Wolf. *Ind. Eng. Chem.*, October 1, pp. 908–910.

DRYING.—The drying of solids. II.—T. K. Sherwood. *Ind. Eng. Chem.*, October 1, pp. 976–980. The effects of adjoining dry surfaces, radiation from the surroundings, and air velocity on the rate of drying of solids in the constant rate-of-drying period are described. The falling rate period is shown to be in general divisible into two zones; in the first the rate of drying decreases because of a decrease in the wetted surface; in the second and final zone of the drying process internal liquid diffusion controls the drying. A simple empirical equation is found to fit the data reasonably well in the falling rate period, and to afford a simple basis of calculation in drier design.

GENERAL.—Modern conception in physics and their relation to chemistry. J. Langmuir. *J. Amer. Chem. Soc.* October, pp. 2847–2868.

Intensively dried carbon tetrachloride. S. Lenher. *J. Amer. Chem. Soc.*, October, pp. 2948–2950. In contrast with the work of Baker, the author finds that carbon tetrachloride which has been in contact with pure phosphorus pentoxide in a sealed tube for five years shows no change in boiling point or molecular weight which can be attributed to intensive drying.

Studies on pyrethrum flowers. I.—The quantitative determination of the active principle. G. B. Gnadiger and S. C. Corl. *J. Amer. Chem. Soc.*, October, pp. 3054–3064.

German

ANALYSIS.—Conductometric titration of solutions of sodium salts of the lower fatty acids. M. Gehrcke and H. H. Willrath. *Zeitschrift angewandte Chem.*, October 12, pp. 988–990.

Advances in analytical chemistry in 1928. A. Rauch. *Chemiker-Zeitung (Fortschrittsberichte)*, October 16, pp. 101–108.

APPARATUS.—A new viscometer. A. Kämpf and O. Schrenk. *Kunstseide*, October, pp. 376–381.

New appliances for the microscopical and chemical analysis of fibres. A. Herzog. *Kunstseide*, September, pp. 334–338, October, pp. 381–386.

GENERAL.—Do we need separate tables of "scientific" and "practical" atomic weights? A. Thiel. *Chemiker-Zeitung*, October 19, pp. 813–814.

The downward direction of the gas stream in technical gas reactions. H. Ditz. *Chemiker-Zeitung*, October 16, pp. 805–806.

Floating factories. I. and II. H. Hauptvogel. *Chemiker-Zeitung*, October 9, pp, 786–787; October 16, pp. 806–807. An account of ships in which fish are treated immediately for the production of various substances.

The recovery of valuable solvents in artificial silk manufacture. O. Krebs. *Kunstseide*, October, pp. 389–392.

ORGANIC.—The condensation of acenaphthenequinone with phenols. I. Matei. *Berichte*, September 18, pp. 2095–2098.

The action of chlorsulphonic acid on aldehydes. K. Fuchs and E. E. Katscher. *Berichte*, September 18, pp. 2381–2386.

PLANT.—New plant for the distillation and evaporation of substances in thin layers. O. Zahn. *Chemiker-Zeitung*, October 16, pp. 807–808.

SOAP.—Advances in the soap industry in 1928. J. Davidsohn. *Chemiker-Zeitung (Fortschrittsberichte)*, October 16, pp. 109–130.

VITAMINS.—Comparative investigations on the vitamin-B content of fresh yeast and of dry yeast prepared from the latter. A. Scheunert and M. Schieblich. *Biochemische Zeitschrift*, Vol. 213, Parts 1–3, pp. 220–225. No evidence was found for a decrease in the vitamin-content as a result of the drying process.

Miscellaneous

ANALYSIS.—The electro-titrimetry of the iodomercurates. L. Marcq. *Bulletin Soc. Chim. Belgique*, August-September, pp. 259–264 (in French).

The potentiometric determination of morphine by means of an iodomercuric reagent. L. Marcq. *Bulletin Soc. Chim. Belgique*, August-September, pp. 265–270 (in French).

GENERAL.—The action of alkali oxalates on lead halides in aqueous solution. N. Demassieux. *Comptes Rendus*, October 7, pp. 535–536 (in French).

LUBRICANTS.—The sampling and analysis of mineral lubricating oils and lubricating greases. *Bulletin Fédération Industries Chimiques Belgiques*, August-September, pp. 351–380; October, pp. 415–436 (in French).

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

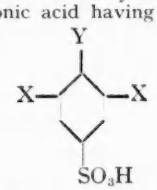
Abstracts of Complete Specifications

319,147. Electrolytic Revivification of Ferrocyanide of Potassium formed in the Purification of Gases by Oxidation of Hydrogen Sulphide with Ferricyanide of Potassium. R. Brandt, 4, Klaus Grothstrasse, Bergedorf, near Hamburg, Germany. Application date, October 4, 1928.

In the regeneration of potassium ferrocyanide by means of air under pressure, some of the complex cyanogen salts are lost. This loss can be avoided by electrolytic regeneration but electrolytic cells with nickel electrodes and diaphragms are necessary. In this invention, a solution of potassium ferrocyanide is electrolysed, with or without alkali or alkali carbonate in an electrolytic cell with or without a diaphragm, and with electrodes of iron. Anodic corrosion of the iron is prevented if the caustic potash present is converted into potassium carbonate, and this may be done by adding potassium bicarbonate or carbon dioxide. The regeneration to potassium ferricyanide may be effected without removal of the sulphur from the liquid, and it is found that the colloidal sulphur is partly changed into a state in which it will settle out. This sulphur alone is then separated before the liquor is used again for purifying gas. A special construction of an electrode is described for electrolysing the ferro-cyanide.

319,149. Vic. Trihalogen Benzenes, Manufacture of. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 4, 1928.

These products are obtained by diazotising the halogen-amino-benzene sulphonic acid having the formula :—



where Y represents halogen or an amino group, and X represents an amino group where Y is halogen and vice versa, converting into the 1:2:3-trihalogen-benzene-5-sulphonic acid by means of Sandmeyer's reaction, and heating with sulphuric acid. A temperature of 250°-280° C. is required, and sulphuric acid of 80-90 per cent. strength. At the above temperature 1:2:3-trihalogen-benzene sulphonic acids and 1:2:3-trihalogen-benzenes distil together, and are then separated, and the trihalogen benzene sulphonic acid returned to the process. The products are used as starting materials for the production of dyestuffs of the thio-indigo series.

319,228. Calcium Sulphate, Preparation of. P. Spence and Sons, Ltd., and S. F. W. Crundall, Manchester Alum Works, Holland Street, Manchester. Application date, June 14, 1928.

The process is for the preparation of calcium sulphate in a very finely divided and amorphous form. Hydrated calcium sulphate, either in the form of gypsum or prepared artificially, is treated with a dehydrating agent such as sulphuric acid of specific gravity 1·6. The mixture is agitated until dehydration and disintegration are complete, and the anhydrous calcium sulphate is washed, dried, and calcined. The strength of the sulphuric acid may be varied according to the temperature employed, and the time of contact. Other dehydrating agents such as sulphur trioxide, phosphoric acid or acid salts, may be used. When impure forms of hydrated calcium sulphate are used, the process also removes iron compounds from them.

319,296. Nitrated Aromatic Amino Compounds, Manufacture of. British Celanese, Ltd., 22 and 23, Hanover Square, London, W.1, D. H. Mosby, H. C. Olpin, and G. H. Ellis, of British Celanese, Ltd., Spondon, near Derby. Application date, June 18, 1928.

In the production of nitro derivatives of aromatic amines, particularly those having one free para position and one free ortho position or two free ortho positions to the amino group, *e.g.*, aniline, *o*-anisidine, or *p*-toluidine, isomeric nitration products are formed or mixtures of lower and higher nitration products, and these are not easily separated. It is found that pure nitration products can be obtained by nitrating arylsulphonyl derivatives of aromatic amines by nitric acid of 55-75 per cent. strength, and hydrolysing the products. The products are mono- or di-nitrated in the amine nucleus according to the conditions. The products are then hydrolysed with a concentrated strong mineral acid. By this process, *p*-toluene sulphon-*o*-anisidine yields pure 5-nitro-2-amino-anisol and 3:5-dinitro-2-aminoanisol, *p*-toluene-sulphon-*p*-toluidine yields 3-nitro-4-amino-toluene and 3:5 dinitro-4-amino-toluene. Other arylsulphonyl derivatives of these amines may be used, *e.g.*, the benzene-sulphonyl derivatives, and also the derivatives of aniline, *o*-toluidine, *p*-anisidine, *o*- and *p*-phenetidine, and *o*- and *p*-chlor-aniline. The dinitro aromatic amines are purified by taking advantage of their resistance to diazotisation compared with the mono-nitration products, so that by treating with nitrous acid under suitable conditions the dinitro compound is unaffected and the mono-nitro compound is diazotised and eliminated by filtration. Examples are given.

319,396. Gas Containing Sulphuretted Hydrogen, Purification of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, June 20, 1928.

In the purification of coal gas, producer gas, etc., by means of catalysts such as nickel, iron, cobalt or copper or their compounds, it is found that improved results are obtained by adding about 5 per cent. of lead, bismuth, or copper, or small additions of alkali or alkaline earth compounds. These activators may also be added to the mixed catalysts consisting of one or more heavy metals capable of combining with sulphur, and one or more oxygen transferring metals or metalloids of groups 4, 5, and 6, such as chromium, vanadium, silicon, carbon, or molybdenum. These activators reduce the initial reaction temperature by 40°-50° C., and the temperature range of the reaction is wider. The efficiency of the catalyst is reduced by a deposit of carbon due to decomposition of impurities in the gas. It is found that this may be avoided by allowing the temperature of the reaction to rise according to the degree of contamination of the surface. The hydrogen sulphide is converted into dioxide or trioxide, and these may be recovered by treatment with an alkaline agent such as a sulphite-bisulphite mixture. An example of the process is given.

319,407. Azo Dyestuffs, Process for the Manufacture of. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, June 23, 1928.

These dyestuffs are obtained by tetrazotising a benzidine disulphonic acid or dicarboxylic acid or a derivative, coupling with two molecules of a middle component or with one molecule of two different middle components capable of further diazotisation, tetrazotising again and coupling with two similar or dissimilar molecules of 2-amino-8-naphthol-disulphonic acids or N-aryl substituted 2:8-aminonaphthols substituted either by two sulphonic groups in the naphthalene nucleus or by one sulphonic group in the naphthalene nucleus, and by a sulphonic or carboxylic group in the N-aryl nucleus. These dyestuffs have no affinity for cotton, but have a high solubility, and are very suitable for direct printing on silk. The shades obtained are blue-black, brownish-black or black, and several examples are given.

319,433. Acetic Acid, Production of. S. W. Rowell, Norton Hall, The Green, Norton-on-Tees, Durham, and Imperial Chemical Industries, Ltd., Millbank, London, S.W.1. Application date, July 7, 1928.

A 10-25 per cent. solution of acetaldehyde in acetic acid is treated continuously with air or oxygen in very finely divided form by forcing the gas through a porous plate which supports a

body of the solution in a tower which may be provided with heating and cooling coils. The escaping gas may be washed with acetic acid to recover acetaldehyde, and this may be done in the upper portion of the tower. The acetaldehyde is then oxidised in the lower portion of the tower. The pressure may be 1-5 atmospheres.

319,441. Ammonium Carbonate, Process for the Production of. W. Wilson, "Kingsley," Rollstone Road, Burton-on-Trent. Application date, July 20, 1928.

Coal gas is freed from tar, compressed to 50 lb. per square inch, and passed through water or ammoniacal liquor. Sufficient carbon dioxide is thereby dissolved to react with all the ammonia, forming a saturated solution of ammonium carbonate or bicarbonate which crystallises out. The greater affinity of ammonia for carbon dioxide under these conditions prevents the formation of ammonium sulphide.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—289,412 (Elektrizitätswerk Lonza) relating to absorption of oxides of nitrogen, see Vol. XVIII, p. 615 ; 296,999 (I.G. Farbenindustrie Akt.-Ges.) relating to sulphonated derivatives of unsaturated fatty acids, see Vol. XIX, p. 466 ; 299,800 (Climax Molybdenum Co.) relating to production of molybdenum-bearing iron, see Vol. XX, p. 7 (Metallurgical Section) ; 301,727 (Chemical Works, formerly Sandoz) relating to C.C.-disubstituted barbituric acids and 1-phenyl-2 : 3-dimethyl-4-dialkylamino-5-pyrazolones, see Vol. XX, p. 130 ; 305,121 (Appareils et Evaporateurs Kestner) relating to production of ammonium nitrate, see Vol. XX, p. 340 ; 305,132 (Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude, and E. Urbain) relating to fertilisers see Vol. XX, p. 340 ; 305,578 (I.G. Farbenindustrie Akt.-Ges.) relating to anhydrous aluminium chloride, see Vol. XX, p. 360.

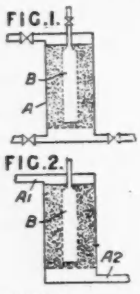
International Specifications not yet Accepted

317,456. Synthetic Resins. British Celanese, Ltd., 22, Hanover Square, London. (Assignees of W. H. Moss and B. B. White, Cumberland, Md., U.S.A.) International Convention date, August 16, 1928.

Toluene sulphonamide is condensed with formaldehyde or other aldehyde or compound having a reactive methylene group in presence or absence of urea. Particulars are given of the use of this resin in conjunction with cellulose-derivatives and various solvents and other substances.

317,719. Catalytic Apparatus. Compagnie Internationale pour la Fabrication des Essences et Pétroles, 1, Avenue de Villars, Paris. International Convention date, August 20, 1928.

Treatment of gases with solid catalysts is effected in apparatus in which the gases are admitted to the catalyst through a large perforated area enveloped by the catalyst. In Fig. 1,



317,719

the catalyst is regenerated by blowing in air or steam through a perforated pipe B, and in Fig. 2 sulphuretted hydrogen is admitted through the tube B to a metal oxide, hydrocarbon vapour is admitted through inlet A1, and hydrocarbon vapour produced by the reaction of the nascent hydrogen on the hydrocarbons admitted is drawn off at A2.

317,731. Production of Hydrogen from Hydrocarbons. Ges. für Linde's Eismaschinen Akt.-Ges., Hollriegels Kreuth, Munich, Germany. International Convention date, August 20, 1928.

Hydrocarbon gas mixtures containing at least 60 per cent. hydrocarbons are freed from hydrogen and catalyst poisons by cooling to a low temperature and fractionating. Water vapour is added, and the mixture passed over a highly sensitive catalyst at about 500° C. A mixture of hydrogen and carbon dioxide is obtained and is purified in a similar manner. The unconverted hydrocarbons are returned to the process.

317,780. Coal Gas Purification. Gewerkschaft M. Stinnes, 136, Vichoferstrasse, Essen, Ruhr, Germany. International Convention date, August 22, 1928. Addition to 305,545.

Coal gas is freed from naphthalene by treating with an oil solvent for naphthalene and then cooling, and the gas is finally washed with an oil of high boiling point free from naphthalene to obtain remaining benzene and other vapours. The oil is then used in the earlier stage as a solvent for naphthalene.

317,780. Preserving Indiarubber. B. F. Goodrich Co., 37, West 60th Street, New York. (Assignees of W. L. Semon, 467, Olive Street, Cuyahoga Falls, Ohio, U.S.A.) International Convention date, August 22, 1928.

Condensation products of aldehydes and secondary aromatic amines which are resinous and non-accelerators of vulcanisation are used as anti-oxidants in vulcanised rubber, and as agents retarding resinification and tack in raw rubber. The condensation products include those of formaldehyde and diarylamines such as diphenylamine, phenyl-β-naphthylamine, dinaphthylamine, tolyl-α-naphthylamine, or poly-secondary amines such as sym-diphenyl-*p*-phenylene-diamine, sym-di-β-naphthyl-*p*-phenylene diamine, *p*-*p*¹-di(phenylamino) diphenylamine.

317,797. Synthetic Resins. British Thomson-Houston Co., Ltd., Crown House, Aldwych, London. (Assignees of R. H. Kienle, 405, Altamont Avenue, Schenectady, N.Y., U.S.A.) International Convention date, August 22, 1928.

Resins are produced from a dihydric alcohol such as glycol and an alcohol containing more than two hydroxy groups together with a polybasic acid or anhydride. Examples include phthalic anhydride, glycerine and glycol, diethylene glycol, or propylene glycol.

Latest Notifications.

27,954. Process for the hydrogenation of coal. Mentzel, A. October 12, 1928.

28,489. Manufacture of readily soluble salts of acridine bases substituted in 9-position by basic residues. I.G. Farbenindustrie Akt.-Ges. October 8, 1928.

29,618. Process for substantially suppressing phosgene-formation when extinguishing fires with carbon tetrachloride. I.G. Farbenindustrie Akt.-Ges. October 11, 1928.

30,488. Manufacture of azo-dyestuffs and the application thereof. Soc. of Chemical Industry in Basle. October 8, 1928.

30,651. Process for the manufacture of easily soluble sodium salts of acylamino-phenol-arsinic acids. I.G. Farbenindustrie Akt.-Ges. October 9, 1928.

30,775. Manufacture of azo-dyestuffs. I.G. Farbenindustrie Akt.-Ges. October 10, 1928.

30,802. Process for the manufacture of mordant dyestuffs. I.G. Farbenindustrie Akt.-Ges. October 10, 1928.

30,875. Process for the removal of the slipperiness from road surfaces. I.G. Farbenindustrie Akt.-Ges. October 12, 1928.

30,948. Printing on wool. I.G. Farbenindustrie Akt.-Ges. October 11, 1928.

30,952. Production of hydrocarbons from naphthalene. Varga, Dr. J. October 13, 1928.

31,166. Process for the manufacture of artificial silk. I.G. Farbenindustrie Akt.-Ges. October 12, 1928.

Specifications Accepted with Date of Application

289,795. Halogen derivatives of organic compounds, Manufacture of. M. Polanyi and S. von Bogdandy. April 29, 1927.

293,316. Ethers or esters of carbohydrates of the type $(C_6H_{10}O_5)$. I.G. Farbenindustrie Akt.-Ges. June 30, 1927.

293,321. Carbonising and distilling wood and coal, Process of and apparatus for. Carbonisation Soc. Général d'Exploitation des Carbones. June 30, 1927.

293,430. Distilling, cracking, and hydrogenating oils, tars, and the like, Process for. Kohlenveredlung Akt.-Ges. July 6, 1927.

293,771. Natural latices, Process for concentrating. K.D.P., Ltd. July 11, 1927.

295,275. Esters, Production of. Holzverkohlungs Industrie Akt.-Ges. August 8, 1927.

298,607. Gypsum and resulting product, Method of treating. C. Camarra. October 12, 1927.

301,500. Pentasulphide of phosphorus, Manufacture of. P. Dutoit. December 1, 1927.

302,144. Antioxidant or age-resister. Goodyear Tire and Rubber Co. December 10, 1927.

303,351. Nitric Acid, Recovery of. I.G. Farbenindustrie Akt.-Ges. December 31, 1927.

303,355. Alkali metal nitrates, Production of. I.G. Farbenindustrie Akt.-Ges. December 31, 1927. Addition to 303,351.

307,061. Technically pure CrO_3. Metals Protection Corporation. March 3, 1928.

307,871. Chromed complexes of chromable azo dyestuffs, Process for the manufacture of. Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Réunies Etablissements Kuhlmann. March 15, 1928.

308,755. Synthetic rubber, Manufacture of. I.G. Farbenindustrie Akt.-Ges. March 31, 1928. Addition to 283,841.

319,341, 320,286-7. Catalytic cracking of petroleum oils, tar, and the like, Apparatus and process for. Compagnie Internationale pour la Fabrication des Essences et Pétroles. September 21, October 2, and October 24, 1928. 320,286 addition to 319,341.

320,030. Polyazo dyestuffs, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt. Ges.*). May 1, 1928.

320,056. Water soluble condensation products, Man ture of— and technical applications thereof. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*). June 28, 1928.

320,069. Copper oxide ammonia cellulose solutions for the production of artificial silk, Manufacture of. A. Carpmael. (*I.G. FarbenindustrieAkt.-Ges.*). June 28, 1928.

320,113. Esters, Production of. Holzverkohlungs-Industrie Akt.-Ges., and O. Fuchs. July 6, 1928. Addition to 295,275.

320,125. Concentrated nitric acid from dilute solutions, Production of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*). July 7, 1928.

320,177. Metals, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) August 13, 1928.

320,182. Calcium hypochlorite, Manufacture of. L. Mellersh-Jackson. (*Mathieson Alkali Works.*) August 18, 1928.

320,185. Recovery of precious metals by amalgamation. D. Enzlin and J. A. Eklund. August 20, 1928.

320,190. Sulphur compounds from gases, Processes for eliminating. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) August 25, 1928. Addition to 310,063.

320,211. Olefines and other hydrocarbons, Manufacture of and apparatus therefor. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) September 14, 1928. Addition to 301,775.

320,210. Crotonic aldehyde, Production of. Holzverkohlungs Industrie Akt.-Ges. and J. Seib. September 13, 1928.

320,268. Vat dyestuffs, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) November 19, 1928.

Applications for Patents

Adco, Ltd., and Ashen, J. Apparatus for manufacture of nitrogeneous fertilisers. 31,179. October 14.

Arnold, C., and Standard Oil Development Co. Manufacture of oxidation products from hydrocarbon materials. 31,806. October 19.

Auer, L. Manufacture of artificial materials from organic isocolloids. 31,258, 31,259. October 15. (May 8, 1928.)

—— Coagulation, etc., of substances containing unsaturated carbon compounds. 31,488, 31,489, 31,490, 31,491. October 16. (May 4, 1928.)

Beckett, E. G., Loveluck, R. J., Scottish Dyes, Ltd., and Thomas, J. Anthraquinone derivatives, etc. 31,603. October 17.

Bowden, W. H. Method of producing liquid preparations from sulphur, etc. 31,233. October 15.

Bunbury, H. M., Clarke, R. B. F. F., and Imperial Chemical Industries, Ltd. Manufacture of sulphurised fatty oil products, etc. 31,125. October 14.

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of artificial masses. 31,165. October 14.

—— Manufacture of fast printings on vegetable fibre. 31,331. October 15.

—— Manufacture of 6-arylamino-2-naphthols. 31,332. October 15.

—— Sizing acetate silk. 31,333. October 15.

—— Manufacture of water-soluble condensation products. 31,618. October 17. (June 28, 1928.)

Coles, S. O. Cowper-. Rust-proofing process. 31,203. October 15.

—— Chromium plating. 31,373. October 16.

Deberag Deutsche Beratungsges. für die Chemische und Metallurgische Industrie. Disintegrating, etc., machines. 31,821. October 19. (Germany, October 19, 1928.)

Dony, O. Reducing metallic oxides. 31,621. October 17. (Belgium, October 17, 1928.)

Fairweather, D. A. W., Scottish Dyes, Ltd., and Thomas, J. Preparation, etc., of dyestuffs. 31,473. October 16.

Geigy, Soc. Anon., J. R. Manufacture of mono azo dyestuffs. 31,299. October 15. (France, October 15, 1928.)

Groves, W. W., and I.G. Farbenindustrie Akt.-Ges. Manufacture of arylides of aromatic hydroxy carboxylic acids. 31,153. October 14.

—— Manufacture of carboxylic acid arylides. 31,711. October 18.

—— Manufacture of urea derivatives. 31,712. October 18.

—— Manufacture of naphthalene condensation products. 31,713. October 18.

Halowax Corporation. Purification of chlor-naphthalenes. 31,728. October 18. (United States, October 19, 1928.)

Henshaw, D. M., Watson, S. G., and W. C. Holmes and Co., Ltd. Removal of sulphur from fuel gases. 31,246. October 15.

Herold Akt.-Ges., and Jager, A. Manufacture of phenol formaldehyde condensation products. 31,298. October 15.

I.G. Farbenindustrie Akt.-Ges. Manufacture of artificial silk. 31,166. October 14. (Germany, October 12, 1928.)

—— Manufacture of material capable of being marked by electrolytic decomposition. 31,452. October 16. (Germany, October 16, 1928.)

—— Manufacture of oily polymerisation products from butadiene, etc. 31,454. October 16. (Germany, October 16, 1928.)

—— Production of vinyl esters of the halogen-hydracids. 31,592. October 17. (Germany, December 7, 1928.)

—— Manufacture of organic arsenic, etc., compounds. 31,714. October 18. (Germany, February 21.)

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Production of aldehydes from α-oxides of hydrocarbons, etc. 31,136. October 14.

—— Production of carbonaceous mixtures. 31,137. October 14.

—— Production of hydrocarbons. 31,138. October 14.

—— Production of vat dyestuffs. 31,139. October 14.

—— Apparatus for low-temperature distillation, etc., of bituminous materials. 31,435. October 16.

—— Soaking hides. 31,436. October 16.

—— Dyeing, etc., cellulose esters, etc. 31,437. October 16.

—— Synthesis of ammonia and alcohols, etc. 31,576. October 17.

—— Production of thiourea. 31,824. October 19.

Imperial Chemical Industries, Ltd. Manufacture of valuable products from natural resins. 31,242. October 15.

—— Separating substances from a single phase. 31,656. October 18.

Kalle and Co. Akt.-Ges. Production of diazo-types. 31,832. October 19. (Germany, October 19, 1928.)

—— Dyestuffs. 31,833. October 19. (Germany, October 19, 1928.)

Lessing, R. Cleaning carbonaceous materials. 31,386. October 16.

Loveluck, R. J., Scottish Dyes, Ltd., and Thomas, J. Production of anthraquinone bodies. 31,472. October 16.

Morgan, J. S. Manufacture of phosphorus or phosphoric acid. 31,104. October 14.

Natta, G. Synthesis of alcohols. 31,470. October 16.

Ramsay, D. M. Distillation of carbonaceous materials. 31,407. October 16.

Scottish Dyes, Ltd., Thomas, J., and Shaw, C. Production of dyestuffs, etc. 31,595. October 17.

Soc. of Chemical Industry in Basle Manufacture of dyestuffs. 30,369. October 7. (Switzerland, October 5, 1928.)

—— Manufacture of azo-dyestuffs, etc. 30,488. October 8. (Switzerland, October 8, 1928.)

—— Process for printing acetate silk, etc. 31,154. October 14. (Switzerland, October 12, 1928.)

High Nitrogen Content of Washington Coals

A SURVEY of the composition and characteristics of the coals occurring in the State of Washington has drawn attention to the exceptionally high content of nitrogen of some of the coals found in that state. Usually the nitrogen content of coal on the as-received basis varies from 0·75 per cent. to 1·70 per cent., with an average of about 1·35 per cent. Most of the coals in Washington approach these percentages of nitrogen. The high-rank coking coals of Pierce County, however, contain an average nitrogen content of 1·95, some samples showing as much as 2·30 per cent. It is probably a coincidence that those coals which have been most greatly altered by metamorphic action contain the greatest percentage of nitrogen. The content of nitrogen on the as-received basis in high-rank coals is, of course, increased by the low-moisture content normal to such coals. So far as is known, the Pierce County coals are uniformly higher in nitrogen than any of those produced in any other countries, with the exception of certain coals in South Africa and Manchuria, which contain up to 2·3 per cent. of nitrogen.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £20 per ton; powder, £21 per ton; extra fine powder, £23 per ton. Packed in 2 cwt. bags carriage paid any station in Great Britain.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—7d. to 10d. per lb. Crude 60's, 2s. 3½d. to 2s. 6d. per gall.

ACID CRESYLIC 99/100.—2s. 2d. to 2s. 7d. per gall. Pure, 5s. 6d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 2s. 2d. to 2s. 5d. Dark, 1s. 6d. to 2s. 2d. Refined, 2s. 7d. to 2s. 10d. per gall.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.

ANTHRACENE OIL, STRAINED, 1080/1090.—4⅝d. to 5¼d. per gall. 1100, 5¼d. to 6d. per gall.; 1110, 6d. to 6¼d. per gall. Unstrained (Prices only nominal).

BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 9d. to 2s. 1d. per gall. Firm. Pure, 1s. 11d. to 2s. 4d. per gall.

XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.

CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, 6¼d to 6¾d. per gall. Middle oil, 4½d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 2d. to 2¼d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8¼d. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent 90/190, 1s. to 1s. 3d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £5 per ton. Hot pressed, £8 10s. per ton.

NAPHTHALENE.—Crystals, £12 5s. per ton. Purified Crystals, £14 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 47s. 6d. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy, prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—4s. 6d. per lb.

ACID H.—3s. per lb.

ACID NAPHTHIONIC.—1s. 6d. per lb.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb.

ACID SULPHANILIC.—8½d. per lb.

ANILINE OIL.—8d. per lb. naked at works.

ANILINE SALTS.—8d. per lb. naked at works.

BENZALDEHYDE.—2s. 3d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8½d. per lb.

o-CRESOL 29/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb, in ton lots d/d.

p-CRESOL 32/34° C.—1s. 11d. per lb., in ton lots d/d.

DICHLORANILINE.—1s. 10d. per lb.

DIMETHYLANILINE.—1s. 11d. per lb.

DINITROBENZENE.—8d. per lb. naked at works. £75 per ton.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 7½d. per lb. naked at works. 66/68° C, 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—10d. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb.

B-NAPHTHYLAMINE.—3s. per lb.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 8d. per lb.

NITROBENZENE.—6d. per lb. naked at works.

NITRONAPHTHALENE.—1s. 3d. per lb.

R. SALT.—2s. 2d. per lb.

SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb.

p-TOLUIDINE.—1s. 9d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall, 32° Tw. 1s. per gall. 24° Tw.

RED LIQUOR.—9d. to 10½d. per gall. 16° Tw.

WOOD CRESOTE.—1s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d. per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton.

BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 10d. to 2s. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—5s. to 6s. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—4⅝d. to 5¼d. per lb.

LAMP BLACK.—£30 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£20 to £22 per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton, f.o.r. London

SULPHUR.—£10 to £13 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra

SULPHUR PRECIP. B. P.—£55 to £60 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—6s. 6d. to 6s. 9d. per lb.

ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton ex wharf London, barrels free.

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity.

ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, £32 per ton; powder, £36 per ton; extra fine powder, £38 per ton. Packed in 2-cwt. bags carriage paid any station in Great Britain.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—2s. 0½d. to 2s. 1d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, MOLYBDIC.—5s. 3d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 7d. per lb. Technical.—1s. to 1s. 2d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 5d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.

AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE —5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.

BISMUTH CARBONATE.—8s. 9d. per lb.

BISMUTH CITRATE.—8s. 3d. per lb.

BISMUTH SALICYLATE.—8s. 3d. per lb.

BISMUTH SUBNITRATE.—7s. 6d. per lb.

BISMUTH NITRATE.—Cryst. 5s. 3d. per lb.

BISMUTH OXIDE.—11s. 3d. per lb.

BISMUTH SUBCHLORIDE.—10s. 3d. per lb.

BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W Qts. 11d. per lb.

BORAX B.P.—Crystal, £20 per ton; powder, £21 per ton. Packed in 1- or 2-cwt. bags carriage paid any station in Great Britain.

BROMIDES.—Ammonium, 1s. 11½d. per lb.; potassium, 1s. 8½d. per lb.; granular, 1s. 7½d. per lb.; sodium, 1s. 10½d. per lb. Prices for 1 cwt. lots.

CALCIUM LACTATE.—B.P., 1s. 2d. to 1s. 3½d per lb., in 1-cwt. lots.

CAMPHOR.—Refined flowers, 3s. 3d. to 3s. 4d. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity other gravities at proportionate prices.

FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 11d. per lb. Green, 3s. 1d. to 3s. 4d. per lb. U.S.P., 2s. 9d. to 3s. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8½d. to 9½d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 19s. per lb. net; Synthetic, 10s. 6d. to 12s. per lb.; Synthetic detached crystals 10s. 6d. to 16s. per lb., according to quantity; Liquid (95%), 9s. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 6d. to 1s. 8d. per lb.

METHYL SULPHONAL.—18s. 6d. to 20s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—3s. 2½d. to 3s. 8½d. per lb.

PHENAZONE.—5s. 11d. to 6s. 1½d. per lb.

PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—102s. to 104s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 7d. per lb. in 1 cwt. lots.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—43s. 6d. per lb.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.

SODIUM CITRATE, B.P.C., 1911.—2s. 4d. per lb., B.P.C. 1923—2s. 7d. per lb. Prices for 1 cwt. lots. U.S.P., 2s. 6d. to 2s. 9d. per lb., according to quantity.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. to 105s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 2s. 2d. to 2s. 4d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—9s. 6d. to 10s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.

THYMOL.—Puriss., 9s. 1d. to 9s. 4d. per lb., according to quantity. Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—5s. per lb.

AMYL CINNAMIC ALDEHYDE.—15s. per lb.

AMYL SALICYLATE.—2s. 9d. per lb.

ANETHOL (M.P. 21/22° C.).—6s. 6d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 3d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 10d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 10d. per lb.

BENZYL BENZOATE.—2s. 3d. per lb.

CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.

COUMARIN.—8s. 9d. per lb.

CITRONELLOL.—9s. per lb.

CITRAL.—8s. per lb.

ETHYL CINNAMATE.—6s. 6d. per lb.

ETHYL PHTHALATE.—2s. 9d. per lb.

EUGENOL.—11s. 9d. per lb.

GERANIOL (PALMAROSA).—20s. per lb.

GERANIOL.—6s. 6d. to 10s. per lb.

HELIOTROPINE.—7s. per lb.

ISO EUGENOL.—13s. per lb.

LINALOL.—Ex Bois de Rose, 12s. per lb. Ex Shui Oil, 10s. per lb.

LINALYL ACETATE.—Ex Bois de Rose, 15s. per lb. Ex Shui Oil, 12s. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—56s. per lb.

SAFROL.—2s. 6d. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—13s. to 15s. per lb. Ex Guaiacol, 12s. 9d. to 14s. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.

ANISE OIL.—4s. per lb.

BERGAMOT OIL.—14s. 9d. per lb.

BOURBON GERANIUM OIL.—19s. 6d. per lb.

CANANGA OIL, JAVA.—11s. 6d. per lb.

CASSIA OIL, 80/85%.—5s. 6d. per lb.

CINNAMON OIL LEAF.—8s. 6d. per oz.

CITRONELLA OIL.—Java, 3s. 1d. per lb., c.i.f. U.K. port. Ceylon, pure, 2s. 6d. per lb.

CLOVE OIL (90/92%).—8s. 3d. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 15s. per lb.

LEMON OIL.—14s. 6d. per lb.

LEMONGRASS OIL.—4s. per lb.

ORANGE OIL, SWEET.—15s. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, October 24, 1929.

RATHER an improved demand is being reported in this market, buyers showing greater interest in covering their requirements for forward delivery, which indicates more confidence in the markets. Prices on the whole continue firm, and in some cases there is a tendency for slightly higher prices. Export trade is improving.

General Chemicals

ACETONE.—There is a steady demand at the firm rates of £75 to £85 per ton, according to quantity, and the market is firm.

ACETIC ACID.—There is a steady trade passing at the unchanged price of £36 10s. per ton for 80% technical, with the usual extra for edible quality.

ACID CITRIC.—As is usual at this time of the year, demand is only for small quantities, and prices are unchanged at about 2s. 3d. per lb., less 5%.

ACID LACTIC.—Demand has been rather better, and the article is firm at £43 per ton for 50% by weight, usual pale quality.

ACID OXALIC.—Demand is fair, and the market firm at £30 7s. 6d. per ton to £32 per ton, according to quantity.

ACID TARTARIC, owing to the season, is quiet and fairly steady at about 1s. 4½d. to 1s. 5d. per lb., less 5%.

ALUMINA SULPHATE.—Firmer conditions are controlling this market, and there is a tendency for the price to advance. Present prices, £7 15s. to £8 per ton for 17/18% quality.

ARSENIC.—The demand is still slow, and there is no change in quotations at £16 17s. 6d., free on rails mines.

BORAX.—A fair business is passing at the slightly advanced rates of £13 per ton.

CREAM OF TARTAR continues firm and in steady demand, £104 to £109 per ton.

COPPER SULPHATE.—Firmer conditions are setting in in this product, especially for forward delivery. Demand is brisk, present prices about £28 per ton, less 5%.

FORMALDEHYDE.—Consumption of this material is increasing, and the market is now settled at about £36 per ton.

LEAD ACETATE.—Firm at about £44 for white, with brown at £43, with a better demand.

LEAD NITRATE.—Unchanged at £33 15s., with a fairly steady demand.

LIME ACETATE.—Unchanged in price, with rather more material available.

LITHOPONE.—Steady at £19 15s. to £23 per ton, according to grade, and in fair request.

METHYL ACETONE.—Steady at £58 10s. per ton.

POTASSIUM CARBONATE.—Unchanged and in good demand at £27 per ton for 96/98%.

POTASSIUM CHLORATE.—In rather better demand at £30 per ton, and the market is somewhat firmer.

POTASSIUM PERMANGANATE.—Increased business is passing, and the market is firm at 5⅜d. to 5⅝d. for best B.P. brands.

POTASSIUM PRUSSIATE.—Firm at £63 10s. to £65 10s. per ton, with increased demand.

SODIUM ACETATE.—White crystal quality is still in short supply, and the market is firm at £22 to £23 per ton.

SODIUM BICHROMATE.—There is an increased demand at 3⅝d. per lb., at which figure the market is firm.

SODIUM HYPO, PHOTOGRAPHIC QUALITY.—Unchanged at £14 10s. to £15 per ton, with commercial at £8 10s. to £9 per ton, with firm demand.

SODIUM NITRITE.—Rather firmer at £20 a ton, with a good demand.

SODIUM PHOSPHATE.—Tribasic firm at £17 to £18 per ton, and in better demand, with dibasic at £12 a ton.

SODIUM PRUSSIATE continues firm at 4⅜d. to 5¼d. per lb., with a good demand.

TARTAR EMETIC maintains its higher price at 11½d. per lb.

ZINC SULPHATE.—Firm at £13 10s., at which price there is a good demand.

Coal Tar Products

The coal tar products market remains unchanged, with no variation in prices to report from last week.

MOTOR BENZOL is unchanged at about 1s. 5½d. to 1s. 6d. per gallon, f.o.r. makers' works.

SOLVENT NAPHTHA remains at about 1s. 2½d. to 1s. 3d. per gallon f.o.r.

HEAVY NAPHTHA is quoted at about 1s. 1d. per gallon, f.o.r.

CREOSOTE OIL remains at 3½d. to 4d. per gallon on rails in the North, and at 4¾d. per gallon in London.

NAPHTHALENES remain at about £4 10s. per ton for the firelighter quality, £5 per ton for the 74/76 quality, and £6 to £6 5s. per ton for the 76/78 quality.

PITCH is still held at 45s. to 47s. 6d. per ton, f.o.b. East Coast port.

Nitrogen Products

Sulphate of Ammonia.—There is no change to report in the price for the above product. It is understood that further supplies of low-grade continental material have been offered at low prices, but the large sellers are holding for £8 18s. 9d. per ton f.o.b. U.K. port in single bags, for neutral quality basis 20·60% nitrogen.

Home.—Only a small demand is reported. Prices remain unchanged at £9 11s. per ton delivered in 6-ton lots to farmers' stations.

Nitrate of Soda.—No large sales have been reported. As supplies appear to be plentiful, buyers are not in a hurry to cover their spring requirements.

Latest Oil Prices

LONDON, OCTOBER 23.—LINSEED OIL was weak and 20s. to 7s. 6d. per ton lower. Spot, ex mill, £44 15s.; November, £41 5s.; November-December, £41 2s. 6d.; January-April, £40 2s. 6d., naked. RAPE OIL was inactive. Crude extracted, £43 10s.; technical refined, £45, naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £32 10s.; refined common edible, £37 10s.; deodorised, £39 10s., naked, ex mill. TURPENTINE was dull and 3d. per cwt. lower. American, spot, 43s. 3d.; November-December, 43s. 9d.; January-April, 45s. 3d.

HULL.—LINSEED OIL.—Spot and October, £43 10s.; November-December, £43 7s. 6d.; January-April, £42 per ton, naked. COTTON OIL.—Egyptian crude, spot, £31 10s.; spot (old), £31; edible refined, spot, £36; technical, spot, £35 10s.; deodorised, spot, £38 per ton, naked. PALM KERNEL OIL.—Crude, 5½ per cent., spot, £33 per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £37 5s.; deodorised, spot, £41 5s. per ton. SOYA OIL.—Extracted, spot, and crushed, spot, £34 10s.; deodorised, spot, £30 per ton. RAPE OIL.—Crushed-extracted, spot, £43 10s.; refined, spot, £45 10s. per ton. TURPENTINE.—Spot, 45s. 9d. per cwt. COD OIL and CASTOR OIL unaltered.

South Wales By-Products

THE brighter pitch demand in South Wales is well maintained. Patent fuel manufacturers and smaller users are buying, apparently in the belief that values, if they change, will do so in an upward direction. Present values are on a basis of 49s. to 50s. per ton delivered, and belief in an increase of values is strengthened by the fact that negotiations are in hand for forward sales. Most of these forward dealings will cover 1930 on the present basis, but slightly heavier Continental shipments would send values up. Road tar remains unchanged at 10s. 6d. to 13s. per 40-gallon barrel. Solvent and heavy naphthas are quiet, and a similar remark applies to sulphate of ammonia. Refined tars have a fair demand, with values unchanged for coke-oven and gasworks tar. Creosote is weak at from 3d. to 4½d. per gallon. Patent fuel and coke exports continue to improve.

Scottish Coal Tar Products Market

VERY little business has been passing during the week and prices are substantially as last quoted. Creosote oil is moving in a quiet way, and cresylic acids are commanding comparatively high prices.

Cresylic Acid.—Market is short of supplies. Prices are firm and inclined to rise. Pale, 97/99%, 1s. 11½d. to 2s. 0½d.; dark, 97/99%, 1s. 9½d. to 1s. 10½d.; pale, 99/100%, 2s. 2d. to 2s. 4d., all per gallon ex works in buyer's packages.

Carbolic Acid Sixties.—Unobtainable in Scotland at the moment. Price nominal between 2s. 4d. and 2s. 6d. per gal.

Creosote Oil is advancing slightly, which is not surprising in view of cresylic shortage. The large stocks held in export tanks, however, tend to retard the upward movement. B.E.S.A. Specification, 4¾d. to 5d. per gal.; gas works ordinary, 3⅛d. to 3⅜d. per gal.; washed oil, 3¼d. to 3⅜d. per gal.

Coal Tar Pitch.—There is no change to report. Stocks are low and little business is passing. Prices nominal as follows:—Coke oven and horizontal, 47s. 6d. f.a.s. Glasgow; vertical, 45s. f.a.s. Glasgow.

Blast Furnace Pitch is as last reported, namely, 30s. per ton rails works for home trade, and 35s. per ton f.a.s. Glasgow for export, both in bulk.

Refined Coal Tar is unchanged. Makers are looking forward to better prices for next season's delivery. Nominal price is 3½d. to 3⅝d. per gal., ex works, in buyers' packages.

Blast Furnace Tar is slow at fixed price of 2⅜d. per gal., rails works.

Crude Naphtha.—To-day's value is about 4⅜d. to 5⅜d. per gal., according to quality and district.

Water White Products.—There is no change from last week. 90/160 solvent naphtha, 1s. 2½d. to 1s. 3d. per gal.; heavy solvent 1s. 1d. to 1s. 1½d. per gal.; benzole, 1s. 5½d. to 1s. 5⅝d. per gal.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, October 23, 1929.

SINCE our last report inquiries and prices remain practically on the same level, with possibly a slight increase in regard to export inquiries. The market on the whole, however, remains fairly steady.

Industrial Chemicals

ACETONE, B.G.S.—£76 10s. to £85 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply, but prices remain unchanged as follows: 98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powder, £32 per ton, packed in bags, carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC, ICE CRYSTALS.—Prompt delivery difficult to obtain and prices now quoted for early delivery round about 8d. per lb., delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Quoted 2s. 2d. per lb., less 5%, ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy; dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at about 3¼d. per lb., ex store. Offered from the Continent at 3⅛d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton ex works for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 5d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. 4½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA, ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton, powdered £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material quoted £37 per ton, ex wharf. On offer for prompt shipment from China at £34 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Now quoted £18 per ton, ex wharf, prompt despatch from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price £4 5s. per ton to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works, or £4 12s. 6d. per ton f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Remains steady at about £36 10s. per ton, ex works.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Price now £37 10s. per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½%, delivered.

POTASSIUM BICHROMATE.—Quoted 4⅞d. per lb. delivered U.K. or c.i.f. Irish ports, with an allowance of 2½% for minimum 2½ tons to be taken.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton ex store. Offered from the Continent at £25 5s. per ton c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100% POWDER.—Quoted £25 10s. per ton ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb. ex wharf.

SODA, CAUSTIC.—Powdered 98/99% £17 10s. per ton in drums, £18 15s. per ton in casks. Solid 76/77% £14 10s. per ton in drums, and £14 2s. 6d. per ton for 70/75% in drums, all carriage paid buyers' stations, minimum 4-ton lots, for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅝d. per lb. delivered buyers' premises with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or Pea quality 27s. 6d. per ton extra. Light soda ash £7 1s. 3d. per ton ex quay, minimum 4-ton lots with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Chilean producers are now offering at £9 9s. per ton, carriage paid buyers' sidings, minimum 6-ton lots, but demand in the meantime is small.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, 52s. 6d. per ton, delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid 60/62% £9 per ton. Broken 60/63% £10 per ton. Crystals 30/32% £7 2s. 6d. per ton delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £10 7s. 6d. per ton; ground American, £9 5s. per ton; ex store.

ZINC CHLORIDE, 98%.—British material now offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £10 per ton, ex wharf.

NOTE.—Please note that the above prices are for bulk business and are not to be taken as applicable to small parcels.

Use of Low-Temperature Coke as Powdered Fuel

THE question of the relative value of powdered low-temperature coke as compared with coal, the usual fuel for heating and power boilers, has been investigated at the Pittsburgh Experiment Station of the United States Bureau of Mines, Department of Commerce. It has been found that the rate at which a flame travels through a cloud of low-temperature coke dust is, to be sure, less than for coal dust. The rate is, however, still rapid enough to permit ready ignition of the coke dust in a furnace. A further investigation was directed toward determining the relative rates at which particles of coke dust and coal dust burn after once having been ignited, for this will determine the rate at which the burning particles will liberate heat in the furnace. It was found that the rate of burning of the low-temperature coke particles is quite comparable with that for coal under similar conditions. It was shown that the powdered low-temperature coke has a definite advantage over powdered coal in that the former is much less liable to spontaneous ignition than the latter, and can probably be stored with safety.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, October 24, 1929.

In a very few instances quotations on the chemical market here show signs of weakness, but it is by no means pronounced, and is perhaps more than made up for by firmness in other lines, the general tone of the market being steady. The movement of the heavy products for home trade consumption against contract commitments continues moderate, with a fair amount of inquiry reported for spot parcels, in most cases for early delivery.

Heavy Chemicals

A quiet business in chlorate of soda has been in evidence this week but values are held at from 2½d. to 2¾d. per lb. Bichromate of soda continues to sell in fair quantities, and prices are firm at 3⅜d. per lb. Sulphide of sodium meets with a moderate demand at from £9 to £9 5s. per ton for the 60-65 per cent. concentrated solid quality, and £8 for the commercial product. Firmness is still a feature of the market for prussiate of soda, values of which are fully maintained at from 4¾d. to 5d. per lb.; buying interest in this material is pretty steady. Caustic soda is in fair request, with contract offers unchanged at from £12 15s. to £14 per ton, according to quality. The demand for hyposulphite of soda during the past week had been on the quiet side, with the photographic grade on offer at about £15 10s. per ton, and the commercial at £9 5s. With regard to alkali, sales of this are fairly satisfactory, and prices are held at about £6 per ton. Bicarbonate of soda is in steady demand, and quotations keep up on a contract basis of £10 10s. per ton, in bags. There is a moderate inquiry about for saltcake still, with values in the neighbourhood of £2 15s. per ton. Phosphate of soda is only in moderate request, but there has been little alteration in the level of prices, current offers being at up to £11 10s. per ton.

Current sales of carbonate of potash are not too active, but quotations are steady at up to £25 10s. per ton for the 96-98 per cent. material. There is a fair amount of interest being taken in yellow prussiate of potash, and quotations are well held at from 6¾d. to 7¼d. per lb., according to quantity. A quiet trade is going through in permanganate of potash, with sales of the B.P. grade reported during the past week at about 5⅜d. per lb., and of the commercial at 5⅛d. Chlorate of potash is steady at 2⅞d. per lb., a quiet business being put through. Sales of bichromate of potash continue on a fairly satisfactory scale and offers in this section are firm on the basis of 4¼d. per lb. Caustic potash is steady at from £32 per ton upwards, according to quantity, though the demand for this has not been particularly active.

A relatively quiet buying movement is reported in the case of arsenic but at about £16 per ton at the mines for white powdered, Cornish makes, prices show little alteration in either direction. Sulphate of copper meets with a moderate amount of inquiry, with offers ranging from about £26 to £26 10s. per ton, f.o.b. The lead products, if anything, are fractionally steadier at round £39 per ton for the brown acetate and £40 for the white; nitrate of lead is obtainable at from £33 10s. to £44 per ton. In the case of acetate of lime, a quiet trade is going through at about £16 10s. per ton for the grey and £8 for the brown.

Acids and Tar Products

The tendency in citric acid seems still to be on the easy side, and down to 2s. per lb. has been quoted this week, without, however, much business being done. Tartaric acid is also comparatively slow, but offers continue to be made at about 1s. 4½d. per lb. Oxalic acid is attracting a moderate amount of attention, and prices keep up at £1 13s. per cwt., ex store. With regard to acetic acid, there is a fair inquiry about for this at firm prices, glacial being quoted at about £66 per ton and the 80 per cent. commercial quality at £36.

Pitch is maintained at about 47s. 6d. per ton, f.o.b., but only a moderate business has been done on this market. Creosote oil is on offer at from 3¾d. to 4d. per gallon, naked at works, with the demand, particularly for shipment, on the quiet side. Carbolic acid crystals are selling in small quantities where supplies are available at about 9½d. per lb., with crude 60's at from 2s. 3d. to 2s. 4d. per gallon, naked. There is a moderate movement in the case of solvent naphtha, with current offers at round 1s. 2½d. per gallon.

Company News

British Drug Houses, Ltd.—An interim dividend of 3 per cent. is announced on the ordinary share capital, payable on November 1.

Anglo-Continental Guano Works.—The net profit for the year ended June 30 was £62,716, and £5,049 was brought in. Debenture interest absorbed £10,411, and the preference dividend £28,125. It is proposed to place £5,000 to depreciation reserve fund, £10,000 to the general reserve fund, and to set aside £2,250 for sinking fund for redemption of debenture stock, and to carry forward £11,948.

J. M. Newton Vitreo-Colloid (1928).—For the period from June 8, 1928, to September 30, 1929, the report states that this period has been one mainly of development and not one of trading. Time and expense have been incurred in training of staff and experimental work, and this has been carried out at a net cost of £5,361. Freehold lands and building expenditure to date of £22,706 includes the site at Dunton Green. Cash in hand amounts to £108,000. Sales organisation is being developed, and all possible energy is being put into completion of works and to arrive at commercial production period at earliest possible moment.

Sensible Heat Distillation.—The report for the year ended December 31, 1928, states that there is no alteration as from last balance-sheet in capital reserve account, which remains at £208,750. On the debit side a loan of £10,000 has been repaid since termination of the financial year from the proceeds of an issue of the company's shares made in January, 1929, when 140,000 2s. shares were issued and applied for at a price of 15s. per share. On the credit side share holdings in associated companies are retained at cost. Developments are proceeding in Great Britain through associated company "L. and N." Coal Distillation and in various foreign countries in relation to patent rights and "L. and N." process of distillation of oil from coal, lignite and shales. The annual meeting will be held at Caxton Hall, Westminster, London, on October 28, at 12.30 p.m.

Goodlass, Wall and Co.—For the fourteen months ended August 31, 1929, the directors report a profit of £72,967, which compares with £52,585 for the twelve months to June 30, 1928. Adding the brought forward of £9,794, there is a total of £82,761. After making provision for dividends paid or accrued to the extent of £30,436, there remains a sum of £52,325. The directors recommend a final dividend of 15 per cent. on the ordinary shares, absorbing £27,145, making a total of 22½ per cent. for the period, against 17½ per cent. for the previous year, that £5,299, against £10,000, be placed to reserve fund, bringing the total to £170,000, and that £19,881, subject to management commission and directors' fees, be carried forward. Since the last annual meeting an agreement has been concluded with Valentine and Co., of New York, for the manufacture and sale in the British Isles and certain colonies of the "Valentine" products.

Borax Consolidated, Ltd.—It is announced that for the first time since the formation of the company (more than thirty years ago) the directors regret that so far as can at present be ascertained they are not justified in declaring the usual interim dividend on the deferred ordinary shares of the company. In a circular to holders of deferred shares, the directors state that the very severe competition which has continued during the past financial year has led to further serious reductions in the prices of borax and boracic acid, and the figures at present available show that a dividend on the deferred ordinary shares has not been earned, but the actual result cannot be ascertained until returns are received from the countries where the company operates and the profit and loss account is completed. During the year the company has, owing to the development of its mine in California, containing a new borate mineral, had to reorganise its operations both at mines and works. It has necessitated the closing down of former sources of production, the removal and re-erection of its ore calcining plant at the new mine, and the transfer of refining operations in the United States from the works at Bayonne, near New York, to the new refinery at the Port of San Pedro, near Los Angeles, California, which is near the new mine, and shows a large economy in the cost of refining.

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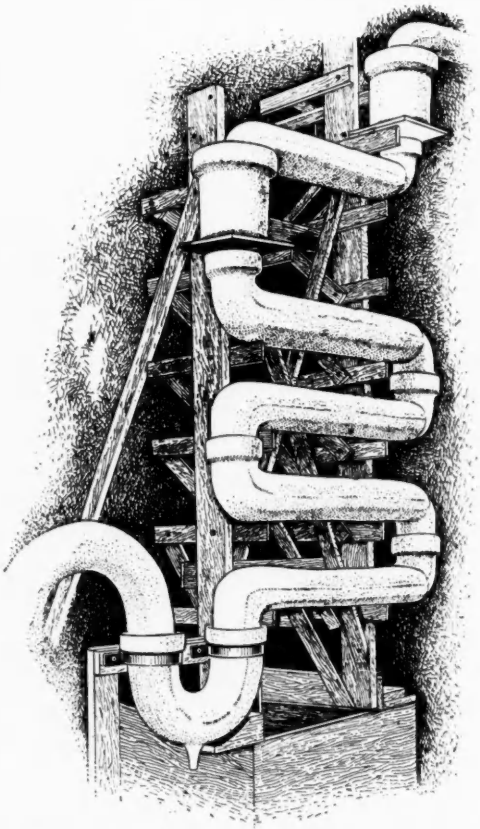

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Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

MARSHALLS CHEMISTS, LTD., 78, High Street, Kingsland, manufacturers. (C.C., 26/10/29.) £11 15s. 10d. September 17.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of* 1908 *provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case, the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

CONSOL PRODUCTS, LTD., Sunbury Common, manufacturers of essences. (M., 26/10/29.) Registered October 11. £350 second debentures, part of amount already registered; general charge. *£14,500. February 25, 1929.

LAUTARO NITRATE CO., LTD., London, E.C. (M., 26/10/29.) Registered October 11, $32,000,000 bonds and 5 per cent. premium (secured by mortgage trust indenture dated July 1, 1929); charged on certain of the company's lands in Chile, etc. *£2,462,405. July 12, 1928.

STORRY, WITTY AND CO., LTD., Hull, paint manufacturers. (M., 26/10/29.) Registered October 8, £13,000 debenture, to Branch Nominees, Ltd., 15, Bishopsgate, E.C.; charged on property at Hull, also general charge. *£5,883. March 4, 1929.

London Gazette, &c.

Winding Up Petition

BRITISH OIL TRUST, LTD. (W.U.P., 26/10/29.) A creditors' petition for winding-up has been presented by Central Trust Co., Ltd., 5, Broad Street Place, London, and is to be heard at the Royal Courts of Justice, Strand, W.C.2, on October 28.

Company Winding Up Voluntarily

CORNWALL CHINA CLAYS, LTD. (C.W.U.V., 26/10/29.) By Special resolution, September 19, confirmed October 7, J. W. Lodge, chartered accountant, 11 and 12, High Cross, Truro, appointed as liquidator.

New Companies Registered

COAL-TAR DISTILLATION PRODUCTS, LTD., Dashwood House, 69, Old Broad Street, London, E.C.2.—Registered as a "public" company on October 18. Nominal capital, £150,000 in 100,000 participating preference and 45,000 ordinary shares of £1 each and 100,000 founders' shares of 1s. each. To adopt an agreement with Conte Ing Gustavo Corinaldi, and to carry on the business of distillers, extractors, producers, manufacturers and suppliers of all solid, liquid, and gaseous substances or matter in any manner derived from coal or from the derivatives of or residuals obtained from coal by combustion, evaporation, distillation or decomposition, or by any other means or process, whether physical, mechanical or chemical. A subscriber: W. H. Walford, 10, Lambourne Road, Leytonstone, London.

JOSOL PRODUCTS, LTD., 7, Eastwood Avenue, Urmston, near Manchester.—Registered October 17. Nominal capital, £250 in £1 shares. Objects: To carry on the business of manufacturers of jointing solutions, and other chemical productions, etc. Directors: C. Owen, R. Kearsley.

McELLIN'S CHEMICALS, LTD.—Registered October 18. Nominal capital, £500 in £1 shares. Manufacturing wholesale and retail chemists, druggists, drysalters, manufacturers of and dealers in toilet and domestic preparations and perfumery, etc. Directors: J. McEllin, 50, Chester Road, Audley, Staffs; J. H. McEllin, F. T. McEllin.

PYNOL UNIVERSAL PRODUCTS, LTD., 261, West George Street, Glasgow, C.2.—Registered in Edinburgh on October 16. Nominal Capital, £100 in £1 shares. Manufacturers of and dealers in chemicals, minerals, ores, tars, metals, etc. Directors: A. E. F. Manson, J. J. Taggart.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks, and Designs.

Opposition to the registration of the following Trade Mark can be lodged up to November 16, 1929.

MONSOON.

503,110. Class 1. Formic acid, acetic acid, bisulphite and sulphite of soda, all being chemical substances for use in manufactures. Planters' Stores and Agency Co., Ltd., 17, St. Helen's Place, London: merchants. May 28, 1929.

Opposition to the registration of the following Trade Marks can be lodged up to November 23, 1929.

AVIROLIT.

506,445. Class 1. Chemical substances for use in the dyeing industry. H. Th. Bohme Aktiengesellschaft (a joint stock company organised under the laws of Germany), 29, Moritzstrasse, Chemnitz, Saxony, Germany; manufacturers. September 27, 1929. To be Associated with No. 476,298 (2,556) and another.

IGEFA.

505,980. Class 2. Chemical substances used for agricultural, horticultural, veterinary and sanitary purposes. Bayer Products, Ltd., 31 to 34, Basinghall Street, London; merchants and manufacturers. September 11, 1929. To be Associated with No. 505,959 (2,691) iii.

IGEFA.

505,959. Class 3. Chemical substances prepared for use in medicine and pharmacy. Bayer Products, Ltd., 31 to 34, Basinghall Street, London; merchants and manufacturers. September 11, 1929. To be Associated with No. 505,980 (2,691) ii.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CREOSOTE.—The Director-General, India Store Department, Belvedere Road, London, S.E.1, invites tenders for 1,500 tons creosote. Tenders due November 12, 1929. Forms of tender available from the above at a fee of 5s., which will not be returned. Tenders are being called for simultaneously in India.

Indian Indigo Exports

EXPORTS OF INDIGO from India during August totalled 55 cwt., as compared with 7 and 123 cwt. in August 1928 and 1927 respectively. Exports for the period January-August totalled 708 cwt., as compared with 624 and 1,250 cwt. in the corresponding periods of 1928 and 1927.